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BRITISH MEDICAL JOURNAL

LONDON SATURDAY SEPTEMBER 2 1944

SOME GENERAL CONSIDERATIONS ON HIGHER OR POSTGRADUATE MEDICAL STUDIES

BY

F. M. R. WALSHE, M.D., D.Sc., F.R.C.P.

A far-sighted and comprehensive outlook upon the problems of higher or postgraduate medical studies is not less vital to the future of medicine at this juncture than is a sound and liberal regime of undergraduate medical education.

In a recent article in the *Journal*[1] I ventured to discuss what appeared to me essential defects in the methods and content of our undergraduate teaching, and in some of the schemes proposed for its improvement. The difficulties in respect of higher medical education, if somewhat different and less obvious, are nevertheless real and pressing, and their consideration is complicated by diversity of view as to what we are to include under the title of postgraduate education. Some attempt at definition is clearly necessary, but in the meantime, however we define their scope, higher medical studies present us with a current problem of the first importance. Whatever form the medical services in this country may ultimately take, they will make heavy demands on the services of consultants and specialists, and while the proper Government authority will doubtless enter with zest into the organizing of doctors within the framework of a medical service, the adequate training of those doctors for the diverse functions they will have to undertake within such a service, and the maintenance of professional standards, are responsibilities we dare not delegate if the service is to become in fact what it should be. That this task is recognized as ours finds a welcome confirmation in some remarks of the Prime Minister, recently made at a luncheon of the Royal College of Physicians (see *Times*, March 3), when he expressed the desire that there should be no lowering of consultant standards in the manning of the future medical services. In short, the intellectual traditions of medicine thus rest in our hands, and their maintenance and enhancement are our responsibility. These, we shall have to remember, will go far beyond the immediate utilities of any national medical service.

We may therefore proceed to consider the aims and methods of higher medical studies, and the nature of the institutions in which they may most fruitfully be pursued.

Role of the Special Hospital and Medical School

While the main academic preoccupation of the great teaching hospitals must remain the training of undergraduates, higher medical studies and research will inevitably continue to be conducted within them, and if the number of whole-time professors and teachers is to be increased it may be hoped that these vital activities will multiply. It is probable, however, that the precise nature of the studies thus followed at any time will depend upon the interests of the then holders of professorial chairs and their teams of workers, and there are special branches of medicine—e.g., neurology, dermatology, paediatrics, etc.—the development of which cannot be left to hazard in this way, but must be pursued methodically in adequately staffed and equipped special hospitals and schools if medicine is to advance on all fronts.

Nevertheless the view has been authoritatively expressed that the day of such hospitals and schools has passed, and that the special branches of medicine may best be developed in the special departments of large general hospitals. This view is strongly contested here as the product of the organizing mind, concerned only with administrative tidiness and ignorant of the scientific and cultural issues involved. The development of specialization in medicine is inevitable and will be progressive, like it or not as we may, and if every undergraduate teaching hospital is to set up the requisite number and variety of special departments, adequate to conduct high-grade postgraduate teaching and research, the multiplication of hospital and laboratory accommodation and facilities, and of personnel, will be enormous and the multiplication of effort and expenditure wasteful in the extreme—and all this with a quite disastrous loss of efficiency.

In every developed special branch of medicine there must surely be a central hospital and institute that shall form the growing point of knowledge in its special field. Here can be gathered with the greatest economy and efficiency the essential clinical and pathological material and full facilities for its exhaustive study. Moreover, a specially trained group of workers all pursuing knowledge in the same field of medicine within the walls of such an institution will enjoy the stimulus that a team can alone provide and that is so vital to the fruitful activity of the scientific worker.

On the other hand, the one or two men staffing the small special department of the general hospital must perforce work in comparative intellectual isolation; nor can they possibly command the material resources of the central institute.

It is therefore submitted that any attempt to disperse such schools and to divide their activities among a group of general hospitals would be a retrograde step gravely adverse to the future of medicine in this country. Special research and the adequate training of specialists can be competently undertaken only in the special hospital and its attached school.

There is also an essential place for the special postgraduate school not confined in its activities to any special aspect of medicine, but free to cover all fields both in research and in the promotion of higher studies. The British Postgraduate School in London already fills this role, and it may become expedient in time to found comparable institutions in other great centres of medical education throughout the country.

The Aims and Methods of Higher Medical Studies

There appear to be some who view the postgraduate school mainly as an institution for the provision of what are euphemistically called "refresher courses" for general practitioners, or, in the near future, for young medical officers to be demobilized from the armed Forces and contemplating a first entry into civilian practice. The value of such courses as a long-term policy is dubious; but, however we view their potential usefulness, it is surely clear that their provision, as an exclusive function of a postgraduate school, expresses an impoverished conception of what such a school should occupy itself with. This provision by no means exhausts its proper functions, though it may easily exhaust the staff. There is also to be considered the provision of opportunities of all necessary kinds for the research workers of the future, and also of facilities for the training of consultants and specialists—functions that are not wholly identical. It is here submitted that

[1] "Some Principles of Reform in Medical Education," *British Medical Journal*, Feb. 5, 1944.

the primary and essential role of a good postgraduate school consists in the provision of a fair field of facilities, and in the creation of a favourable atmosphere, for advanced and original studies. I should therefore put in the following order of importance the functions of a postgraduate school of medicine: (i) the provision of opportunity for research and the advancement of knowledge; (ii) the training of specialists and consultants; and, questionably, (iii) the provision of "refresher courses." The qualification inserted under the last heading is not to be taken to imply that a postgraduate school has no responsibilities towards the general practitioner, but it expresses the grave doubt as to whether the refresher course itself is the proper way in which this responsibility should be discharged, and as to whether this type of course—if its usefulness be conceded—should be undertaken in a school where really advanced studies are pursued. Indeed, my own view is that these two activities—advanced studies and refresher or examination courses—are incompatible in a single institution; for experience, as will later be indicated, has so far shown that the latter tend to destroy the former.

Research and the Advancement of Knowledge

It is possible that some may be impatient with the notion that these really are the primary functions of a postgraduate school. Issues of more pressing importance, such as the early provision of consultants and specialists, may appear to demand priority. This question involves our entire outlook upon what should be the training of these categories of doctor. Few will dispute that a purely teaching institution wherein no one is engaged in the forging of new knowledge, or in thinking on broad lines about the problems of medicine, but where all are occupied with the handing on of established knowledge and the imparting of techniques, is a dead school. At the best it is merely a polytechnic primarily devoted to grinding out courses for this or that specialist diploma. Research and the advancement of knowledge not only serve the ends indicated by their names, but they also provide—and can alone provide—the keen and critical atmosphere in the absence of which we cannot hope to train specialists of the first rank. It is therefore urged that original thought and work are vital elements in the life of any school for higher medical studies, whatever else we may ask of it. Surely, also, now is the time to approach the new medical world opening before us with the highest possible ideals, for the dangers to idealism and enterprise in any State service that is based on an immediately utilitarian point of view cannot be discounted by the most ardent champions of the reorganization of the medical profession.

In an earlier article in the *Journal*,[2] entitled "Strategy and Tactics in Research," I ventured to discuss some of the defects in our present outlook upon research problems, and, while I do not propose to weary the reader with recapitulation, some considerations may be restated. The deep searchings as to the very bases of scientific thought that have stirred the world of physics within recent years have had little echo in the world of biology, including physiology and medicine, and we are in some danger of losing sight of first principles of science in our growing preoccupation with experimental techniques. These are now so ingenious and have proved so valuable in the opening up of fresh fields of discourse about medical and physiological problems—as, for example, in the case of the elaborations of electrophysiology—that not rarely we fail to see the wood for the trees. As techniques multiply and grow more specialized, so width of comprehension shrinks. There develops in consequence the tendency to consider research as adequately conducted by the recording of random observations obtained by the use of new techniques, without further consideration of their wider import and relationships. Science thus comes to be viewed as consisting in mere observation and the accumulation of records, without the generalizations and hypotheses and other intellectual instruments that can alone transform information into knowledge and thus lead to advance. The perusal of current physiological and medical journals reveals that a large proportion of their contents consists of these isolated items of information, and the author, especially if he be young, who ventures daringly to attempt some generalization or synthesis of his findings with those of other workers is in danger of having his contribution declined.

There is, it seems, a pervading intellectual timidity or shrinks from original thought and, in effect, discourages adventures of ideas. Yet, as Whitehead has remarked, "Progress of error is the death of progress." This situation has been candidly summed up by another philosophical writer of to-day thus: "There is little hope of the good scientist, who is minding his specialized business, devoting himself to the broken foundations of his science; it would only be bad betting for him as an individual to give up his time and energy to a critical and general speculative investigation, when he has before him the possibility of pushing his specialty a few solid steps ahead." Such a state of affairs is plainly as adverse to true advance as the opposite extreme of unbridled speculation, and we should not remain content to ask of a man what "discoveries" he has made; we should also proceed to inquire of him what he has made of his discoveries, or, for that matter, of anyone else's.

It should not be too sanguine to hope that we shall in future see at least some centres of higher medical studies that will set themselves to break with this timorous tradition, and to attempt, as among their ideals, the *ordering* of knowledge and the training of men in the basic principles of scientific thought. At no time in the history of medicine and its daughter sciences has a deeply thoughtful attitude to research been more imperative than it now is, and it is this conviction that must be the excuse for a digression that may have seemed to the reader of undue length and doubtful relevance.

The Training of Specialists and Consultants

The wisdom of undertaking this training in institutions wherein original thought and work are actively pursued has already been discussed. In no other way, save by such contacts, can the student be fired to undertake original work himself. To see knowledge being won is, for those who have it in them, the adequate stimulus to add to knowledge. Yet this need not be taken to imply that every would-be specialist or consultant should be expected as a matter of course to undertake research. A man may have the making of an excellent clinician and an admirable teacher without also having a flair for original investigation. This may seem obvious enough, yet the notion encounters some opposition largely from those who like to sentimentalize research as something inherently virtuous by participating in which we must all be the better. Yet research is a means and not an end, and there is no doubt that hitherto a young man hoping to make a place for himself in clinical medicine has found himself under the necessity of "going through the movements" of doing research, and the publication of an "original paper" has been widely taken as a test of his capacity. Thus it is that medical literature has been burdened with far too much inferior matter in order that men may obtain due recognition of gifts and attainments in quite another field of medical endeavour. Against this danger it is to be wished that the postgraduate school of the future may be on its guard. Gifts for teaching and for research are not necessarily combined in a single individual, and generations of science and of medical students have suffered from the popular and eminently respectable illusion that a distinguished scientific investigator must necessarily be fitted to teach the elements of knowledge in his own field. Nevertheless, the original thinker and worker is a leaven vital to the fruitful activity of every medical school, even though not all teachers or students need be expected to follow in his footsteps.

The Role of the Special Diploma

The training of the specialist needs to be both theoretical and vocational, covering both a science and an art of medicine. What is implied by this has already been discussed by me in a recent article on the reform of medical education and must not be further elaborated here. The detailed curriculum of studies essential to the full training of the specialist and consultant also need not be minutely discussed. We may, however, make some mention of the specialist diploma examination as a criterion of competence in the field of medicine.

[2] *British Medical Journal*, April 17, 1943.

[3] Scott Buchanan, *The Doctrine of Signatures: a Defence of Theory in Medicine*. Kegan Paul and Co., London, 1938.

Within the past few years the number of these diplomas has increased considerably, and the Royal Colleges in this country now grant no fewer than nine, not to mention those given by universities. As to their influence upon those postgraduate schools that provide systematic courses for them, it can scarcely be denied that it is wholly adverse—that is, if we accept the conception of the postgraduate school herein submitted. Schools making the provision of the necessary courses a primary activity end by doing nothing else, and their research activities dwindle and die. It would be invidious to seek to exemplify this proposition, but the case may be presented in another way. So far, happily, there has been no specialist diploma in neurology, and up to date the primary aims of the postgraduate school attached to the National Hospital for Nervous Diseases at Queen Square have been to conduct original research and to provide a sound all-round training in clinical neurology and neuropathology to its students; the reward of the latter being the work they had done and the experience they had acquired, and not any label or diploma granted to them. It is interesting to note that this school is the only one of its kind in the country to which, right up to the outbreak of the present war, there was a steady flow of serious postgraduate students from the Dominions, America, and Europe—men and women of professorial and other university status desirous of higher training. At a period in the history of medicine in these islands when, owing to the rapid development of medicine in the United States and the Scandinavian countries, the flow of graduates of this type to this country has virtually ceased, this is a remarkable tribute to a school that has been interested in a culture rather than in a curriculum, in a discipline rather than in a diploma. It is not implied that distinguished leaders in medicine and physiology in this country have not continued to attract pupils from abroad, for we know that they have done so, but that no other postgraduate school, as such, has commanded the reputation requisite to bring graduates of the best type and in considerable numbers to these shores.

While, therefore, the special diploma can hardly be regarded as an inspiring stimulus to, or end of, higher medical studies, it possibly has certain useful though restricted purposes. For example, it may assure a working level of efficiency in such special techniques as those of radiology or anaesthetics, and where a large medical service, such as that of mental hospitals or of tropical medical services, requires large numbers of medical officers, the special diploma course ensures that they acquire an adequate familiarity with the branch of medicine in which they intend to practise. But all this is quite another thing than the acceptance of such a diploma course as adequate to the assumption of consulting responsibilities. These require a deeper foundation of experience in general medicine than the special diploma demands or its curriculum provides.

As an element of value in higher medical studies designed for the training of specialists or consultants there are other and more positive defects in the special diploma, as we know it. It tends to focus the candidate's attention upon a curriculum rather than upon the full range of the subject. It promises to fetter higher medical studies, which are best pursued for their own sakes, in the shackles of the examination system—with us a purely vocational system with no theoretical background; and, finally, if the special diploma were ever to be accepted as a criterion of consultant status in a highly organized public medical service, it would lead to arbitrary and unworkable restrictions upon consulting practice. Thus, how fantastic it would be, though by no means impossible, if no one but the holder of a diploma in psychological medicine were to be permitted to deal with, or to issue certificates in respect of, cases of psychoneurosis, or cases in which a prominent psychological element was present! Such cases, as we all know, loom large in the experience of consultants in every field of medicine, coming disguised as somatic disorders involving the nervous system and every possible organ. Further, a concept of psychosomatic medicine is now being developed which proposes psychological factors of causation for a wide range of somatic illnesses. The practice of medicine would become impossible if all consultants were to be restricted by artificial barriers within the field of medicine, and the general level of medical efficiency would inevitably deteriorate.

The truth surely is that the special diploma tends to breed technicians and not physicians; individuals better able to apply techniques than to make those essential clinical assessments that alone render the employment of techniques, be they of psychology or of bacteriology, a rational activity. It is in the field of therapy that their influence is most baneful. Treatment should be thought of as a whole, "as the total contribution of the physician to the complicated action that is taking place within the patient incessantly." It should not be thought of in isolated categories or in terms of specific instruments or aims. "Therapy is one of the routes by which medicine has been specialized, and by which the specialties have become vicious" (Scott Buchanan, loc. cit.). A final question arises. The special diploma makes no adequate provision for the postgraduate training in general medicine of any aspirant to consultant status. Hitherto the experience needed by the candidate for the London M.R.C.P. has usefully served to ensure this; but if the easy key of the special diploma opens the door to consultant work, who will trouble to acquire this essential foundation of clinical experience? This examination will fall into desuetude, and our standards will fall with it.

The Value of Refresher Courses

Possibly, an equally controversial issue with that just dealt with is provided by the question of the value of the so-called refresher courses. These attempt the impossible—namely, the imparting in too brief a space of time to tired, or even unsuccessful, men of a range and quality of knowledge that cannot be transmitted in this way. As a mode of instruction in specific techniques of diagnosis or of treatment they may have a limited scope of usefulness, but of general cultural value little or none. At best their influence can be but transient. Surely the remedy for the inevitable difficulty of keeping abreast with advances in knowledge and techniques—as this has obtained hitherto under the common conditions of general practice—is not the makeshift expedient of a brief refresher course, but such a replanning of the conditions of general practice as shall prevent the isolation of the doctor and shall keep him in constant touch with hospital and specialist services throughout his professional life. Some such arrangement should be an integral part of any planned medical service. But if the brief and rarely repeated short cramming course is to be retained, then its provision cannot be a function of such a postgraduate school as has been here discussed. The medical staff of such a school could not possibly stand up to the unremitting repetition of such courses without becoming spiritless hacks, and all their more vital activities would inevitably go to the wall. There would have to be organized special institutions for this work, which cannot be combined with the pursuit of higher studies in medicine. It is to be hoped, however, that nothing of the kind will be found necessary in a better-planned medical world.

Conclusions

We may easily, at this juncture, aim too low in our plans for the future of higher medical studies, but we cannot easily aim too high. No craven fear of what official organizing zeal may do to us while we are seeking to maintain our standards, or even to enhance them, should lead us to fall short of our traditions. We still have freedom to think about the future of medicine, and this should not come to be construed as freedom not to think. If we set to work now in earnest there should be ample time, while an agreed form of medical service is being hammered out and then begins to grow, to produce the right type of specialist and consultant and the numbers we shall need of them. We have in fact, in the Prime Minister's speech earlier cited, been invited to maintain our standards.

In assessing what should be the criterion of an adequate specialist and consultant training we shall do well to rely mainly upon securing full opportunities for higher studies, and for research for such as have the gift for it, and upon judging men by their work and achievements during their period of training rather than by the hazards of a postgraduate diploma mill. After all, the great names in medicine are those of men who trained themselves after graduation and owed nothing to educational planning. It is clear, of course, that such a diploma system would make the task of the official "grader" of consultants delightfully easy, for it would provide him with those

paper categories of doctors which would be as useful to him—if not to the community—as a really adequately trained body of consultants. Yet it is not our business to turn out numbers of mass-produced "utility" consultants and specialists just to make an organizer's paradise, but to see to it that the community gets a service worthy of us.

So far the examination system has not imprisoned higher medical studies irrevocably in its paralysing grasp, but we shall need all our vigilance to see that it does not. I will go even further. In the past we have not seldom lost for medical science men of outstanding ability because they did not, at the appropriate time, acquire those alphabetical adornments to their names that we have asked of those to whom we have offered opportunities in consulting and academic medicine. This should not be. Surely in a liberal profession based on science there should be a career fully open to talent. Nothing is better calculated to obstruct this than a barrage of diplomas.

THE USE AND ABUSE OF TRICHLORETHYLENE

BY

G. E. H. ENDERBY, M.B., B.Chir., D.A.

Anaesthetist, E.M.S.

> "In estimating the untoward effects of any anaesthetic agent three factors are always involved—(1) the anaesthetic agent, (2) the patient, (3) the anaesthetist—and only too often the last of these factors is ignored."

Trichlorethylene, a comparatively recent addition to the anaesthetist's armamentarium, has in the last two years come into fairly wide use in this country, and was at first received with applause and thanks for an agent with many useful and unique qualities. The initial enthusiasm, as is so often the case, was soon replaced by an equally severe swing of opinion to the other extreme, in which all its bad qualities and dangers were repeatedly emphasized. It is this latter swing which occupies the pages of so many contemporary journals, and this article has been written in an effort to control and in part to prevent any undue bias, and at the same time to present material from which a more balanced evaluation of this agent can be made. So much that is good can be hidden by a little that is indifferent, and so many are easily biased by the chance observation of a headline, the remarks of a colleague, or even the smell of a particular anaesthetic.

Langton Hewer (1942) first brought his careful investigation of this agent before the Royal Society of Medicine, and in that report gave particulars of its chemistry, physical properties, and anaesthetic quality. No further mention will be made of these particulars, but attention will be focused instead on the use of this agent, with special reference to its limitations and to the bad effects of ignorance and misuse.

Apparatus

It has become customary to place the trichlorethylene in the chloroform bottle of the Boyle apparatus. This practice is convenient, but at the same time affords scope for a grave misuse of the agent, for only too often the *minimum* which such a bottle will allow proves to be too great for maintenance of the patient, whereas any approach to full delivery, with gases bubbling through the liquid, gives a higher vapour concentration than any patient ever requires. Here then lies a danger, and one into which fall so many who are not conversant with the small amount of trichlorethylene that is needed. It can be stated with confidence that very few patients require more than the minimum vapour flow from such a bottle, and indeed this may often prove an overdose. An extremely small percentage receive the full flow with the plunger elevated to the top, and never has it been found necessary to increase the vapour concentration any further by lowering the plunger towards the surface of the liquid; but on many occasions I have observed administrators labouring under a *full load* of trichlorethylene, with a difficult patient showing a respiratory rate of 60 to 80 a minute. These administrators, too, are the first to complain about the "disadvantage of trilene" in raising the respiratory rate!

Thus the type of apparatus commonly employed is one reason for misuse of this agent, and for a considerable period a drip-feed of the vinesthene pattern was employed instead. This works very well, but the property of trichlorethylene of dissolving fats so readily soon makes all the joints leak, and the apparatus becomes dirty and wasteful. Furthermore, vaporization in the stream of cold gases is difficult. However, it is felt that some device constructed along these lines, by which a very small minimum dose could be given, or alternatively a well-designed vaporizing bottle for the Boyle machine, would be a considerable help in avoiding overdosage. Marrett's trichlorethylene–air apparatus has bottles which allow good vaporization of the liquid, and it appears possible with this apparatus to obtain the small minimum dose required.

Induction and Depth of Anaesthesia

Induction with trichlorethylene is difficult, and it is here that trouble may arise, for in attempting to obtain the requisite depth of anaesthesia there is a tendency to use more and more of the agent. This increase of vapour concentration *rarely* brings with it the desired diminution of muscle tone, and this when it was first used, seemed to be a great drawback and disappointment. However, it was soon appreciated that other agents can be easily employed to carry the patient smoothly and quickly into the third stage and to obtain the desired relaxation; the further course of the anaesthesia can then be conducted smoothly and without incident under trichlorethylene. Once the necessary relaxation has been obtained and the stage of surgical anaesthesia reached, this state can be maintained indefinitely on a minimum of the agent, which suffices to hold a steady plane of anaesthesia showing little tendency to change. First-plane anaesthesia is the usual level, though an occasional patient shows signs of the second plane; and it is fortunate indeed that the lighter plane is sufficient depth for the performance of the overwhelming majority of surgical operations. With trichlorethylene it is as a rule impossible to obtain the deeper levels of third and fourth planes, and the recognized signs associated with those levels are certainly not observed. Any attempt thus to deepen the anaesthesia usually meets with one or other of two conditions—(1) a rising respiratory rate, or (2) sudden respiratory arrest. In other words, trichlorethylene has a very limited working range; but for reasons previously stated this is a most useful range, and, furthermore, physiological disturbances occur with considerably less frequency in such lighter planes.

For convenience, and where a barbiturate is not contra-indicated, pentothal, or some similar rapidly acting intravenous anaesthetic, is employed for induction, and is followed by nitrous oxide and trichlorethylene on the Boyle machine. The necessary relaxation is provided by the barbiturate, and if sufficient has been given to tide over the time required for the introduction of the trichlorethylene, then such relaxation is maintained for the duration of anaesthesia, and a quiet smooth anaesthesia results. In cases in which a barbiturate is not desirable, or is contraindicated, the induction is made with nitrous oxide, followed by a little oxygen and then trichlorethylene. Cyanosis is avoided, as this tends to persist under trichlorethylene even with an ample sufficiency of oxygen. With adequate well-timed premedication it is possible to produce the necessary relaxation under nitrous oxide and trichlorethylene alone, but in 50% of cases muscular relaxation under this agent is still not adequate—i.e., arms and legs are usually stiff, and vague wandering movements are to be seen in fingers and wrists and feet—and small quantities of ether have to be added to produce it. The very small amount of ether required at this stage is impressive, and relaxation can often be produced with but two or three minutes of ether on the Boyle machine. Once relaxation has been obtained a return is usually made to the trichlorethylene, and no further ether is required for the duration of anaesthesia. It thus appears that trichlorethylene is an excellent "maintenance agent," and its best effects are to be observed when it is used as such.

From the preceding paragraphs it becomes obvious that trichlorethylene is given no part in producing relaxation, and this is even truer when considering the minority of cases which need additional degrees of muscular relaxation. These cases

consist chiefly of abdominal operations, particularly those involving the upper abdomen, and trichlorethylene plays little part in such work. There is, however, one interesting combination which has been used a considerable number of times with complete success—viz., avertin followed by nitrous oxide and trichlorethylene, which allows of abdominal surgery with an adequate degree of relaxation. This combination offers advantages where diathermy is required inside the peritoneal cavity, but attention must be paid to the time of administration of the avertin so that the operation may start 10 minutes after the drug has been given. Lack of attention to this detail soon leads to failure.

The exact relationship between depth of anaesthesia and the degree of muscular relaxation is difficult to determine, but depth alone is not the only major factor. Probably the activity of the respiratory centre has an equally important role, and in this respect it is interesting to note that careful attention to respiration under trichlorethylene will often allow an adequate relaxation for what are sometimes difficult operation fields—e.g., herniotomy and appendicectomy. Rising respiratory rates in such cases almost invariably invoke comments on "tightness" from the surgeon.

Amount of Anaesthetic Agent Required

I have stressed the undesirability of using much trichlorethylene, and further details must now be given of the various signs which have been found helpful in judging the need for more or less anaesthetic during the course of the operation. These signs are characteristic of trichlorethylene, and close observation of any patient will show how they form a picture, some details of which are outlined also by other agents, but in which most of the finer lines are individual.

(a) Overdosage

Overdosage is considered first; for usually, as indicated, our machines give too big a vapour concentration, and overdosage is much easier than the reverse. The easiest sign is the rise in the respiratory rate, which may occur soon after the usual induction or at any stage during the course of the anaesthesia. The rise is often quite sudden, and with careful watching is soon detected, although the respiratory rate is usually about 35 a minute before the observer becomes aware that it is too fast. At this point there is only one course of action—removal of the source of trichlorethylene and allowing what is already in the patient to diminish gradually through loss at the expiratory valve. It is then found that the rate gradually subsides to a reasonable level, and over a period of about 5 minutes falls to 20–30 a minute, which is about the average for this agent when used carefully. When this level has been attained a minimum of trichlorethylene should be readmitted for maintenance and a very careful watch kept for a further increase of rate. This may occur a second time; but the condition is just as amenable to treatment as before (or even more so), and rarely does the trouble appear more than twice in the same subject, so the remainder of the operation is free in this respect. It should be emphasized that adequate time must be allowed for the respiratory rate to return to normal. The time varies with the degree of overdose, but usually about 5 minutes is required on the Boyle machine with a total gas flow of about 6 to 8 litres a minute. Some cases respond in a few minutes, others may need 10 to 15 minutes; but all respond in the right direction, and show a marked improvement before they become inadequately anaesthetized, as of course all cases eventually will unless receiving a very high percentage of nitrous oxide. High concentrations of nitrous oxide with trichlorethylene have been found undesirable, as there is an increased tendency to tachypnoea; and the reverse is shown when high oxygen concentrations are used. The patient who is allowed to continue with a much-raised respiratory rate becomes increasingly difficult to quiet, so that the condition may then persist for the remainder of the operation in spite of otherwise adequate measures. Immediate attention should always be given to this complication.

It is estimated that 90% of all cases under trichlorethylene will show this rise of respiratory rate in response to an overdose of the agent, and most of the remaining 10% experience respiratory arrest. This occurs suddenly, without any preliminary respiratory variations as may be observed with some other agents. It responds always to a lowering of the vapour concentration, with perhaps a little help from carbon dioxide and oxygen, and of course it causes additional anxiety. Individuals who show this reaction may do so again during the course of the operation: with early administrations it was once recorded five times during one operation, after which a change was made to another agent. These patients seem to jump from first or second plane straight down to respiratory arrest without any intermediate signs. The reaction has never been observed in any case showing tachypnoea.

There still remains one further small group of patients who give trouble from overdose, but of a peculiar type. Here the only observation that can be made is that the respiratory rhythm is "not quite right." On careful examination it is found that the length of each respiration varies, and particularly is this so with the expiratory fraction. Some are short and crisp, others longer and slightly irregular, and yet even with these variations the type of respiration is "automatic," and the patient is of course surgically anaesthetic. These cases respond well to a removal of trichlorethylene, and after a few minutes there is a return (often sudden) to the correct satisfying automatic respiration. In these cases there may also be some slight tachypnoea, but this is not marked.

It must not be overlooked that a very small percentage of the cases will show no rise or other change of respiratory rate whatever, even under an obvious overdose. These cases are few and far between, but their existence may help to explain the delayed recovery sometimes seen, or other peculiar complications which have been described.

(b) Underdosage: Patient becoming too "Light"

Two main signs are found to be of service here. They are the respiratory rate and the presence of stridor. As the anaesthesia lightens, the respirations, as already noted, gradually become slower and quieter, until eventually their slowness and quietness become "too flattering," when caution should be exercised. It is here that stridor often makes an appearance, followed by a period of difficult anaesthesia. The stridor may occur suddenly with great severity, but more often it is of gradual onset, and the usual clinical picture is of a slow quiet respiration associated with a definite stridor which does not improve, but indeed deteriorates until more anaesthetic is given. If the anaesthesia has been of short duration until this moment, then movements of the fingers and feet, and sometimes face and head, are also seen, but rarely do these signs give any useful information before those previously described.

It must be remembered, however, that respiratory rate and depth under anaesthesia depend also upon the degree and severity of the surgical stimulus, and upon individual susceptibility to these stimuli, in addition to any specific pharmacological action of the anaesthetic agent in use at that time. This must be carefully borne in mind; for an inadequately anaesthetized patient will show many respiratory variations at the onset of operation, and any particularly severe stimulus (e.g., crushing of the sciatic nerve) may temporarily affect one who is otherwise adequately anaesthetized. Also it occasionally happens that in correcting a rapid respiratory rate due to trichlorethylene overdosage the patient swings quickly into the realm of inadequate anaesthesia, and the respiratory rate, which at first was diminishing satisfactorily, starts to rise again in response to an increasing stimulus. This may cause some difficulty at first, but it is soon recognized by the association of other signs, such as stridor, and perhaps muscular activity. Furthermore, if the patient is carefully watched, this state is detected before any further difficulty arises, and can be treated accordingly.

Abnormal Findings under Trichlorethylene Anaesthesia

(a) Cardiac Irregularities

Irregularities occur in about 6% of all cases anaesthetized with trichlorethylene, and careful examination seems to indicate that they are extrasystoles. Unfortunately E.C.G. findings have not been available. The clinical course of these cases is usually along the following lines. At first there is a gross irregular irregularity of pulse lasting for several minutes, which eventually gives place to a pulsus bigeminus—viz., a normal

beat, an extrasystole, and a pause—and this state usually lasts for about another 5 minutes, at the end of which time, and some 10 to 15 minutes after the onset of irregularities, there is a sudden termination of irregularities and a return to a normal regular rhythm, which then remains as such for the rest of the operation. The change to normal rhythm is often sudden, but sometimes pulsus bigeminus is replaced by trigeminus, then an extrasystole at increasing intervals, and finally a normal rhythm with an occasional extrasystole at infrequent intervals. These irregularities are usually seen at the outset of the anaesthesia, and they have always been observed to run the course outlined above, and have never caused any clinical disturbance or upset. The administration of the anaesthetic is not interrupted, and although some cases have occurred during periods of obvious overdose they cannot be associated in general with this state.

Similar abnormal cardiac rhythms are also to be observed under other anaesthetic agents, and the above picture is by no means characteristic of trichlorethylene. More careful observations may indicate that these irregularities are related not so much to the agent as to the type of induction of anaesthesia and to the physical disturbances of respiration consequent on breathing into machines and through valves, or to the presence of laryngeal spasm. However, such obvious signs must not pass unheeded, and always a careful watch should be kept for clinical features in such patients. More careful investigations—by E.C.G. studies, etc.—are obviously desirable.

(b) Nerve Palsies associated with Herpetic Lesions

Two papers were recently published in the *B.M.J.* (Carden, 1944; Humphrey and McClelland, 1944) giving details of cranial-nerve palsies together with herpetic vesicles, and the association of these conditions with closed-circuit trichlorethylene anaesthesia. A reaction between trichlorethylene and soda-lime, with the production of a toxic compound, dichloracetylene, which is responsible for these lesions and in some instances for the death of the patient, seems a reasonable conclusion from the evidence presented. In support of this claim a similar case has been observed at this hospital. This case occurred some considerable time ago, and was among the first 100 cases anaesthetized with this drug.

A strong healthy man aged 26 came to operation a second time for internal derangement of the knee-joint. The first operation, performed under N_2O-ether, was without complications. The second was done under N_2O-trichlorethylene after premedication with omnopon 1/3 gr. and scopolamine 1/150 gr. Induction was performed on the Boyle machine, and a little ether was added at the start to obtain the necessary relaxation, after which a return was made to trichlorethylene alone. Soon after induction a Waters to-and-fro absorber was introduced into the circuit, and closed-circuit anaesthesia maintained for the remainder of the operation—1 hour. It must be pointed out that this was the second case that morning which had been given closed-circuit trichlorethylene, and the same canister of soda-lime was used for both. It was noted, with the first case, that the absorber became *very hot*. On recovery this patient had considerably more vomiting than is usual, and there was some headache. The second case gave evidence of a bilateral trigeminal analgesia occurring 24 hours later, with an eruption of minute vesicles around the mouth after 48 hours. On the third day there was some interference with vision in the right eye, but no diplopia or loss of movement. A right facial palsy (lower motor neurone type) developed on the fifth day, and on the eleventh day the ophthalmologist reported two or three small vesicles on the epithelium of the right eye. The patient made a slow recovery, and after three months the facial palsy was cured, but there was still slight hypo-algesia of the face—"feeling of numbness."

The following details of the present condition of this patient (1 year 8 months after operation) were very kindly sent me by Dr. R. J. Isaac.

"Still complains of numbness of whole of face and tip of tongue. Some impairment of sensation of light touch over the whole of the trigeminal area (bilateral). Notices that air dust causes no pain in the right eye. Some impairment of vision in the right eye. No obvious residual 7th-nerve palsy, but slightly more difficult to close the right eye than the left. Symptoms are said to be worse in cold weather."

This case caused great interest, and it was at that time very carefully examined for any evidence which might link the aetiology with the trichlorethylene, but it was decided that any association was unlikely. This belief was strengthened by the report from the dermatologist, and later from the neurologist, who agreed with the diagnosis of herpes zoster. It was considered, therefore, as a case of herpes zoster complicated by other cranial-nerve palsies, and of chance association with the immediate post-operative period. No further significance was given to this single case until the recent report of cases of a similar nature, when the old notes were inspected and showed the following significant facts:

1. Closed-circuit anaesthesia was used, and the soda-lime had previously been in contact with trichlorethylene, and had shown a marked temperature rise.

2. Recovery was slow and vomiting considerable. Indeed, both cases which had had closed-circuit trichlorethylene anaesthesia that morning showed a slow recovery with much vomiting, and a note entered at the time states that "Sister said she thought neither of these two cases had had the 'new' anaesthetic."

Of the very large number of cases that have been anaesthetized with trichlorethylene fewer than 6 have been given closed-circuit anaesthetics. The significance of this one case occurring as it does in so limited a number of closed-circuit anaesthetics when so many semi-open anaesthetics have been uneventful, cannot be overlooked, and, pending final proof in this matter, trichlorethylene should be rigidly avoided in all closed-circuit machines.

Delayed recovery, prolonged vomiting, marked headache, and other abnormal findings which have been reported, have not been observed during the routine use of this anaesthetic on the Boyle, the Marrett, or similar trichlorethylene-air apparatus.

Conclusion

Trichlorethylene was first used nearly two years ago. Its distribution was then still very limited and a small supply was obtained privately. It has been employed consistently since that date, and now approximately 2,000 cases have received trichlorethylene as either the major or the minor agent, and have been personally supervised. These cases include all the types of operation commonly met with at a large general hospital, except intrathoracic surgery (excluding empyemata) and extensive intracranial operations. Orthopaedic, gynaecological, midwifery, and general surgical cases comprise the bulk of this total. Ages have ranged from 3 months to 90 years, and the patients have shown all states of physical fitness.

At first some difficulty was experienced with this anaesthetic agent, as already indicated, and some of the untoward signs previously described caused confusion. It was noted, however, that these difficulties became more infrequent and less troublesome as further experience was gathered in its use. It is suggested, therefore, that many of the complications and "hazards" of trichlorethylene are not indeed such by nature, but are due to faulty administration and to misuse of a valuable agent.

To obtain the best results from trichlorethylene it is essential to know its characteristic features. It is not enough to place it in the chloroform bottle and to expect similar signs and the same response as are obtained with ether. The whole picture must be carefully understood, and the utmost emphasis must again be laid on the limitations of this agent. When it is used with the knowledge of its peculiarities and a respect for its limitations it attains a position of value which many anaesthetists now recognize.

Summary

Details are given of induction and depth of anaesthesia usually obtained under trichlorethylene anaesthesia. No attempt should be made to "push" this anaesthetic for additional depth or more muscular relaxation. It should be used only as a "maintenance agent."

Signs associated with overdose and underdose are described together with an outline of their treatment.

Details are given of abnormal findings during and after anaesthesia.

My thanks are due to Dr. A. D. Marston and Dr. C. Langton Hewer for their kind help and advice, and to the medical superintendent, Dr. E. D. Grasby, for permission to publish the details of the above case.

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TREATMENT BY MOVEMENT

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The essence of the treatment of moving parts is movement. The manner in which therapeutic movement is most effectively applied varies from tissue to tissue. Choice of method is also influenced by the nature, position, and extent of the lesion, the integrity or not of such structures as nerve and bone, and the presence or absence of bacterial infection. In affections of moving parts, therefore, a necessary preliminary to treatment by movement may be the elimination of sepsis, the reduction of a fracture, splintage, or operations. The object of all these measures is to put the patient into the best position to benefit from treatment by movement. Speed is essential; for the shorter the period of immobilization the smaller the amount of stiffness and weakness.

The relative gravity of soft-tissue and bony injury must be assessed, and treatment directed to the more important component. Thus, in fracture of the surgical neck of the humerus the injury to bone can be ignored and the associated damage to soft parts treated at once. In other cases—e.g., a Colles's fracture—the paramount consideration is at first the maintenance of accurate reduction. The usual result of fracture of the shaft of the femur is not failure of the bone to unite but a stiff knee. Hence Young's (1942) method of so putting up this fracture that knee-flexion exercises can be begun at once provides another instance. Again, the renewed advocacy of plating for fractures of the leg bones (Burns and Young, 1942) clearly results from a wish to facilitate treatment by immediate movement. External splintage entails a stiff tarsus and a prolonged period of rehabilitation during immobilization and after the plaster cast has been removed. Internal splintage means that such stiffness is never allowed to develop. Orthopaedic surgery is undergoing changes as a result of orientation towards measures whose cardinal aim is to keep moving parts moving from the start.

Therapeutic movement may be divided into two categories—specific and non-specific. Those movements that bear directly on the patient's disability are termed specific; those that maintain general physical fitness and affect the injured part only incidentally are called non-specific. Non-specific movement takes the shape of gymnastics, games, and occupations like carpentry or gardening; they are performed under the supervision of the gymnast or craftsman and are not considered further in this paper, which deals with the more individual application of treatment by movement.

Specific Movements for Muscles

The chief function of muscle is to contract; as it does so it becomes wider. Thus the primary requirement for muscle is a capacity to broaden fully; the secondary, to lengthen fully.

Active Exercises.—These restore mobility and power to muscle and maintain cortical awareness of capacity for movement. They should be graduated and purposive so as to bring both muscle and mind into action. Active exercises represent the essence of the treatment of minor muscular traumata, in which the paramount consideration is healing in the presence of enough movement to ensure a strong and supple scar. Unwanted adhesions are best prevented from forming by full broadening out of the injured muscle; hence an adequate contraction in the position of full shortening must be secured. It is also wise to ensure full elongation of the damaged muscle by voluntary contraction of its antagonist, advantage thus being taken of reflex inhibition of tone. Passive movements can stretch but cannot broaden muscles out; they have therefore no value in the treatment of minor muscular injuries. The brachialis muscle stands alone in its unsuitability for active treatment. A contraction of muscle induced by faradism has neither more nor less local value than an equal voluntary contraction. But the patient's mind is not brought to bear. Thus faradism may occasionally be employed as a useful prelude to active movement but never as a substitute. Otherwise the patient falls into the error of supposing that his muscles should receive periodic treatment, whereas it is essential to inculcate the idea of restoration of function by his own supervised but unaided efforts. Breathing exercises, post-operative, post-natal, and postural exercises, and precision exercises for neurological disease are all carried out actively.

Resisted Exercises.—These strengthen muscle and enhance its tone. They are called for when an increase in muscular power is required; hence they provide the keystone of treatment in the muscular wasting that follows disuse, immobilization, operations, or arthritis. In the case of minor muscular tears, resisted exercises should be begun only when union is well advanced; for if started too soon they put excessive strain on developing fibroblasts. These rupture again and a series of relapses leading to chronic traumatic fibrositis results. Sending a patient back to heavy work shortly after minor damage to a muscle is mistaken policy; for he is apt either to hold the part stiffly (thus avoiding therapeutic movement) or to allow a series of excessive pulls on the healing breach, each leading to renewed disablement. Herein lie the seeds of one type of traumatic neurasthenia. Unsupervised use of a muscle and the proper employment of therapeutic movement may thus be seen to have little in common. It is by free active contraction that muscular mobility is maintained in most situations; resisted exercises leading to heavy work may be instituted only when a firm and supple scar has formed.

Occupational therapy stimulates patients' interest and provides them with resisted exercises of a purposive type. The mind is brought to bear; morale is raised and precision is rewarded.

Deep Massage.—When the movement of a muscle is considerably restricted by the rigidity of the part which it spans, active exercises, even begun soon after an injury, may prove ineffective in maintaining mobility. Still less can they be expected to free scar tissue already formed. This state of affairs exists chiefly near the insertion of muscles into bone and in the muscles of the trunk. Thus the fibres at the iliac origins of the sacrospinalis and gluteus medius, at the scapular insertion of the vertebro-scapular, at the thoracic course of the erector spinae, at the occipital attachment of the semispinalis capitis, at the costal attachment of the abdominal oblique muscles, and at any part of the intercostal muscles can seldom be kept adequately moving by exercises of any sort. The only really effective way to restore mobility, and the best way to retain it, in these special positions is by deep massage applied transversely to the affected area. By this means the masseuse separates out the muscle fibres, thus preventing interfibrillary adhesion and rupturing such adherent scars as have already formed. This passive broadening out of muscle is only a therapeutic exaggeration of its normal behaviour. At all accessible situations deep massage is more effective than active contraction in securing full mobility of muscle in cases of recent injury; in chronic cases or in the special situations enumerated above it represents the only effective method. Active exercises follow the friction; *they maintain the added mobility afforded by the massage.* Thus rehabilitation by graded exercises and occupational therapy is very seldom called for in muscular rheumatism. Rheumatic—like traumatic—inflammation leads to resolution with fibrosis, not to weakness or wasting. The chief symptom is pain when the muscle moves; the aim of treatment is the restoration of full painless mobility. Accurate deep massage forms the central pivot of treatment, followed by a few minutes' instruction in the maintenance of mobility by active exercises.

Assisted Exercises.—These are used to elongate muscle and in cases of muscular weakness from severe arthritis or nervous disease. When a muscle needs to be lengthened the patient contracts the antagonists as powerfully as he can; meanwhile the movement is assisted by his own body-weight, by the pressure exerted through the muscles of his other limb, springs, weights acting over a pulley, or by the masseuse. When muscle power is much reduced gravity may have to be offset by the masseuse's help, immersion in brine, or slings.

Continuous Stretching.—Contracture in muscle due to ischaemia, healed sepsis, or prolonged immobilization can often be partly or wholly overcome by continuous traction with weights or by pressure splintage. Once the increased range of

movement has been secured it is maintained by passive and active movements carried out several times daily. A splint should be worn to prevent recurrence, and is particularly valuable in cases complicated by peripheral nerve lesions. The fingers must not be included in splints worn merely for a nerve palsy; they stiffen quickly, and months of rehabilitation may be required to correct rigidity that need never have arisen.

Movement under Local Analgesia.—In the immediate treatment of any muscular injury the unrestricted active movement secured by local analgesia possesses great therapeutic value. Pain ceases; whereupon local inhibition of movement is abolished, a full range of active movement resulting at once. In chronic cases local infiltration is curative only when a muscle is affected some distance from its attachment to the bone. Hydraulic pressure seems ineffective in freeing adhesions within a muscle unless the lesion lies at its most distensible part—the belly. The bellies of the trapezius, latissimus dorsi, pectoralis major, extensores carpi radialis, gluteus medius, and gastrocnemius muscles may be singled out as usually responding well to local infiltration. My view is that the action of such injections is unrelated to the local analgesic that the solution contains: the benefit is due to the physical effect—akin to that provided by natural movement or deep transverse massage—i.e., the water broadening the muscle out. Acute lumbago provides the most spectacular success for local analgesia. The patient, immobilized in bed and aware from past experience that he will remain so for perhaps a fortnight, gets up after his muscles have been anaesthetized and moves freely. Next day, apart from some soreness, he is able to go about his business. This result cannot be attained by mobilization under general anaesthesia; for this succeeds only in stretching the muscle without broadening it out. Doubtless faradism under general anaesthesia would succeed, but it is far simpler to make the patient move the muscle himself during the period of local analgesia. In severe cases the whole lumbar extent of both sacrospinalis muscles must be infiltrated to achieve this satisfactory result.

Specific Movements for Joints

Contrary to general belief, mobility is maintained at a joint just as well by passive as by active movement. It is the muscles about a joint, not the joint itself, that are influenced by the type of the movement. Hence, provided that the joint *is moved*, the agency is immaterial. It is difficult to see how any controversy could exist over this obvious truism. A joint is merely a passive hinge, dependent for its maintenance as such on being periodically moved.

Active Movements.—These are employed to retain mobility at a joint and slowly to increase the range. Their cardinal use is to keep normal structures normal. Thus all the joints of an injured part not actually immobilized should be put through their full range of movement daily, preferably actively, and therapeutic occupations chosen that bring the limb into effective play. The treatment after orthopaedic operations and the reduction of most fractures entails the regular performance of a series of suitably graded exercises. In most of these cases passive movements do not hasten recovery. After interference with joints such as excision of a meniscus from the knee, the traumatic arthritis set up by the operation recovers at a fixed maximum rate that is attained only when the proper exercises—first without, later with, weight-bearing—are conscientiously carried out. Inadequate treatment slows recovery and may even prevent it altogether, but there is an intensity of treatment by movement beyond which it is pointless to go.

Gentle Passive Movements.—These are used to increase the range of movement at a joint the site of a recent sprain (except the elbow). They are also required to maintain range pending recovery from neurological lesions. Adhesions about a joint are prevented from forming by the fact that the joint is moved, no matter by what agency. A ligament, for example, moves over subjacent bone just as much during passive as during equal active movement. Moreover, the patient is most quickly induced actively to increase the range of movement at a joint by a previous demonstration of the painlessness of the passive range. Full recovery from articular sprains is thus retarded by the present-day insistence on active movements alone in rehabilitation. However much this limitation may apply to some muscles, active movements have no virtue over passive movements in the treatment of many sprains affecting joints. Indeed, they may be less effective, in so far as they are often performed through a smaller range. Hence the use of passive movements followed by their active repetition achieves the quickest results.

Forced Movements.—These are of two types—a quick jerk and a slow stretch. A quick jerk is called for when limitation of movement at a joint is caused by post-traumatic adhesions. *Patients should not be asked to rupture their own adhesions.* These should be broken passively with or without anaesthesia (according to circumstances) by the surgeon or the masseuse. Thereupon the patient must maintain the added range by his constantly repeated active endeavours, supervised, and if necessary assisted, by the masseuse. Slow stretching out is indicated in capsular contracture due to immobilization, diffuse scarring or osteo-arthritis. Continued pressure by the masseuse or by means of apparatus is required; thereupon the increase in movement is retained actively. Resisted exercises for the coincident muscular wasting are always called for. Movements, especially forced, are contraindicated in the treatment of those joints that rely for their stability on their capsule and ligaments alone. When no muscle controls movement at a joint, sprain may result in permanent laxity. Only harm could result from further overstretching. Moreover, this is not required; for the prerequisite to adhesion formation—namely, healing in the absence of enough movement—is necessarily absent. Thus treatment of sprains of the acromio-clavicular, sterno-clavicular, sacro-iliac, and cruciate ligaments is protection and modified rest.

Deep Massage.—There exist various ligaments whose mobility is maintained or restored more effectively by massage than in any other way. The outstanding examples are the supraspinous ligaments and those at the knee. Exercises aggravate lesions of the supraspinous ligaments; mobilization under anaesthesia has little effect; whereas adequate digital friction is regularly successful in restoring mobility within a few weeks even in the most chronic cases that have resisted every other treatment. The coronary ligaments at the knee do not span the joint. Hence, adequate mobility after a sprain cannot be retained by moving the knee, whether actively or passively. Rotation sprains therefore get well very slowly. Nothing is easier than to keep the ligament moving by drawing the finger to and fro across it; and it is only by the masseuse's friction that adequate treatment by movement can be secured. Active exercises and instruction in gait follow. Any surgeon who cares to order this treatment will find that full recovery is obtained in as many weeks as it formerly took months. The same considerations apply with almost equal force to lesions of the medial collateral ligament—the commonest sprain at the knee. This ligament has a range of movement over the bones, lying anteriorly when the knee is fully extended and being drawn posteriorly as the knee is increasingly flexed. Since synovitis prevents a full range from being attained at the knee immediately, the ligament cannot be put through its full extent of movement by merely moving the knee. Hence unwanted adhesions form. Friction to the ligament moves it passively to and fro in imitation of its normal behaviour and prevents adhesion formation. Active exercises and instruction in gait follow at once. The same happens in cases of chronic sprain here: friction applied to the site of scarring wears down fibrous tissue to such an extent that passive forcing without anaesthesia becomes easy. In this case the massage prepares the way for the mobilization. The speed of recovery from sprains of the tarsal and carpal joints is also enhanced by deep massage, but the results are less spectacular.

Resisted Exercises.—These are employed when a diminished range of movement at a joint is desirable. A joint may be so disorganized that all movement is painful, and the patient too elderly for an operation like arthrodesis. This is often the position in advanced osteo-arthritis of the hip. An attempt to stabilize the joint by increasing the strength and tone of the muscles about it may be made by the use of faradism, static contractions, or exercises so resisted that no movement takes place. Exercises are given for the same reason to the short flexor muscles of the foot in the treatment of strain of the mid-tarsal joint or plantar fascia. The increased strength

of these muscles diminishes movement, thus avoiding excessive stress on the joint capsule or fascia. Compensation for over-stretching of the cruciate ligaments, by increasing the strength and tone of the quadriceps muscle, provides another case in point.

Specific Movements for Tendons

Tendons are treated only passively. Since tenosynovitis and tendinitis are often the result of over-use, exercises merely repeat the causative strains and aggravate the condition.

Deep Massage.—In tenosynovitis the cause of the pain appears to be friction between the surface of the tendon and the inner aspect of its sheath. The phenomenon of crepitus shows that roughening of these surfaces occurs, and the fact that cure follows operations slitting the sheath up shows that the roughening ceases to matter as soon as the sheath no longer fits accurately. Orthodox treatment by immobilization is cumbersome, slow, and uncertain in its results; moreover, in some situations (e.g., at the knee or shoulder) it is barely feasible. Deep massage to the affected stretch of tendon is always the treatment of choice, and is quickly successful. At the wrist, shoulder, and knee failure is almost unknown. In the case of tenosynovitis, it is my belief that the masseuse's transverse friction smooths the roughened surfaces off again. Though the results in tendinitis are equally consistent, the mode of action is obscure.

Manipulation.—A minor tear at a teno-periosteal junction can sometimes be stretched out enough to allow healing with slight lengthening. Mills's manipulation for a tennis-elbow acts in this way.

Anaesthesia and Analgesia

These are required when an attempt at the projected movement sets up such pain that the patient cannot allow its performance. Four methods exist, each with its own indication.

General Anaesthesia.—Consciousness has often to be abolished when the spinal, shoulder, knee, and tarsal joints require mobilization. Full muscular relaxation is an essential preliminary to forcing movement.

Local Analgesia.—Stretching muscles out under general anaesthesia has little or no therapeutic value, since broadening of the muscles cannot be secured thus. On the other hand, active use during the period of local analgesia, by allowing full broadening during a contraction that pain would otherwise have prevented, is a most useful measure, particularly in acute lumbago and minor muscular tears. Local analgesia is also the treatment of choice in ligamentous sprains during the first 24 hours after the accident. Not only is movement facilitated but the reflex that causes oedema, effusion into the joint, and muscular spasm has its point of departure removed for the duration of analgesia. Division of muscular or fascial adhesions with a tenotomy knife under local analgesia, followed by immediate active movements designed to ensure healing with lengthening, is called for in stubborn lesions of the trunk muscles.

Heat Analgesia.—Heat increases blood supply and thus enhances the speed of destruction of the substance—Lewis's P-factor—responsible for the pain. Heat applied to a structure before it is stretched enables the patient to permit forcing through a greater range. To this end, the heat must reach the tissue at fault, usually the capsule of the shoulder, hip, or spinal joints. Hence short-wave diathermy is required; radiant heat has far too superficial an effect.

Massage Analgesia.—When a soft structure accessible to the masseuse's finger is to be treated by movement, deep massage is usually called for and has two effects. It induces traumatic hyperaemia; hence relief from pain is felt as soon as the friction ends. Like heat, therefore, massage given deeply results in an enhanced oxygenation of P-factor. Unlike heat, it also applies therapeutic movement to the part. Friction should thus be preferred for its double action when accessible structures need to be moved, heat being reserved for those outside the masseuse's reach.

Rehabilitation

The best rehabilitation is such effective treatment in the first place that little is required. When overriding considerations—e.g., sepsis, more serious injury elsewhere, or environmental lack of facilities—lead to the development of stiffness and weakness, much time and endeavour must be devoted to the restoration of function. The present trend of orthopaedic surgery is towards the adoption of measures which ensure that treatment by movement can be begun so soon after the injury that stiffness and weakness have not had time to develop. In such cases active exercises maintain rather than restore power and mobility.

Graded exercises form an important part of the technique of rehabilitation. But it is a retrograde step to limit the scope of rehabilitation to active exercises alone. The particular method should be chosen that best brings treatment by movement to bear on the affected part.

Masseuses' main function is the application of treatment by movement. They are skilled in its three main divisions—active movement, passive movement, and deep massage. It is mistaken policy to limit treatment to the use of only one of these three measures. The indications for each kind of therapeutic movement are distinct but by no means mutually exclusive. Though it is undeniable that until lately there existed a tendency for masseuses to administer much misdirected radiant heat and gentle massage for conditions calling for exercises or deep massage, the pendulum is now swinging too far the other way. At present patients whom properly given friction would quickly relieve stand in real danger of being set to perform a series of exercises. Hence a sense of proportion must be maintained and the whole field of treatment by movement surveyed before the appropriate method is chosen and the masseuse instructed.

There is only one difficulty. A decision on the type of treatment best calculated to restore mobility rests on an accurate determination of the site of the lesion and of the nature of the damaged tissue. Deep massage affords effective treatment by movement only when applied to the right spot in the right way. Hence the masseuse must be provided with a diagnosis precise in detail before any question of friction can arise at all. The same applies to local analgesia, whether employed for diagnostic or for therapeutic purposes. Clearly, at a rehabilitation centre or in a physiotherapy department no less than in the other parts of a hospital, the best results are obtained when an exact diagnosis affords the pointer to equally exact treatment.

Summary of Principles

Most of the muscles of the limbs can be kept strong and mobile by active, later resisted, movements.

The muscles of the trunk span rigid parts and thus require deep massage to restore their mobility; active exercises then retain the added movement. This applies as much to traumatic as to rheumatic fibrosis.

Acute fibromyositis, whether traumatic or rheumatic, is best treated in the first instance by active movement under local analgesia.

Joints under muscular control (except the elbow) should be treated by movement after a sprain. Whether such movement is passive or active is immaterial; in practice, passive followed by active movements secure the best results.

Joints not under muscular control should be treated by rest after a sprain.

A few ligaments are more effectively moved by deep massage than in any other way. Active exercises retain the added range. During the first 24 hours after a ligamentous sprain local analgesia is the treatment of choice.

Tendons are treated by deep massage. No exercises follow.

Rehabilitation entails the selection of the type of therapeutic movement best suited to the lesion present, after precise diagnosis has been arrived at.

Full use should be made of masseuses, whose main function is the application of treatment by movement.

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G. H. Faget and others (*Publ. Hlth. Reps. Wash.*, 1943, **58**, 1729) have tried out a number of sulphonamide drugs in the treatment of leprosy. They find that the most effective of these is promin (known as promanide in Great Britain). They do not claim that it is a specific of leprosy, and observe that it has no bacteriostatic action on *M. leprae*, but conclude that it is capable of inhibiting the progress of the disease in a number of cases, the drug for the most part being given intravenously.

A FATAL CASE OF MUSTARD GAS POISONING

BY

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There have fortunately been no opportunities of seeing the fatal effects of mustard gas on human beings in this country since the last war; therefore it may be of interest to record my observations on a family who became contaminated with mustard gas, and the post-mortem findings on the one patient who died.

History of Case

Some boys entered a W.D. area and found a few mustard bombs which had exploded and been left covered with bleach powder. They threw stones at them, and one burst into flames, giving off smoke to which a boy aged 8 was exposed for several minutes. Later, when the flames were extinguished, he picked up the bomb and in so doing scattered some of the contents on his jersey and trousers. This was a white powder consisting of bleach mixed with the remains of the liquid mustard in the bomb. The boy returned home about an hour later complaining that his arms and legs were burning. His mother states that the exposed parts of his body, not face, looked as if they were severely sunburnt. She stripped and washed him and put him to bed. She washed his jersey, but the other clothing was left hanging in the room where the mother and four children were sitting for an hour or so before going to bed.

About two hours later the boy started vomiting, as did the other members of the family, and all complained of intense pain and irritation of the eyes. By the next morning five members of the family were suffering from severe conjunctivitis, and the boy had blisters on his penis and thighs, while his elder brother, who shared a bed with him, also had blisters on his thigh and arm.

Clinical Record and Treatment

The mother and four children were immediately admitted to hospital. The originally contaminated patient was suffering intense discomfort from his eyes; they were watering profusely, and he was quite unable to open them. The penis was swollen and blistered, as were the inner parts of the thighs, while an area of erythema extended over the forearms, abdomen, and thighs. The blisters were aspirated and cod-liver oil applied to the burnt areas. The eyes were irrigated with normal saline every two hours, 10% sulphacetamide (albucid) drops were instilled every four hours, and 1% atropine drops were put in twice a day until full dilatation was obtained.

During the next 24 hours further blisters developed, spreading peripherally from the original burns and also on the buttocks, which rapidly became very raw. Vomiting ceased, but was replaced by an irritable cough. The respirations rose to 40 a minute, the temperature to 101.2°, and pulse to 140; the boy was restless and delirious, and incontinent of urine and faeces. This stage continued for about 36 hours, with alternating periods of lucidity and delirium. He began to show signs of pulmonary congestion, and was given sulphathiazole tablets. Frequent irrigation of the eyes was discontinued 24 hours after admission, and the exudate merely washed out before putting in the sulphacetamide and atropine drops.

Three days after admission his general condition improved; he was rational and no longer incontinent, and took his food and drinks well. There was slight oedema of the cornea, and the conjunctivitis was still very marked, though he was now able to open his eyes.

The burnt areas, chiefly of first and second degrees, were clean, but the erythematous areas on the legs, arms, abdomen, and chest were gradually extending and being replaced by blisters. The cough was very troublesome at times, chiefly tracheal in type, and a few crepitations were heard at the lung bases. There was some nasal catarrh but no sputum. Inhalations of menthol compound on a Burney Yeo mask gave some relief. The temperature all this time was fluctuating between 98 and 101°, but the general condition was improving, and sulphathiazole was discontinued on the sixth day after admission, 23 g. having been given. At this stage his non-protein nitrogen and urinary calcium were normal, and a sternal puncture showed no abnormal cells.

A blood count taken on the fifth day showed 13,000 white cells per c.mm. with 88% polymorphs, but two days later this had dropped to 3,800, when the sulphathiazole was discontinued. From this date the white cell count and also the haemoglobin fell rapidly and the temperature steadily rose. The boy became very irritable and particularly resented exposure of his skin to the air. The pulmonary signs increased and he appeared to have difficulty in clearing mucus from his trachea.

His abdomen became very distended and tender, especially on the right side. His white cell count on successive days was 13,000, 7,600, 3,800, 1,200, 600, 200 per c.mm., and at this stage the 200 cells were made up of polymorphs 12%, monocytes 14%, lymphocytes 26%, pathological lymphocytes 48%. Blood transfusion had been considered when the agranulocytosis developed, but was not done as it meant cutting down through burnt tissue. However, as four or five injections of 10 c.cm. of pentnucleotide had no effect it was decided to start continuous blood transfusion, and between the eighth and tenth days three pints of fresh blood and one pint of glucose-saline were given. On the eleventh day his abdomen was less distended and tender and the bowels were acting. The temperature was, however, 104°, respirations 30, and the cough was very troublesome. Mentally he was bright, he was drinking well, and his kidneys were acting normally. His condition, however, steadily deteriorated during the next 24 hours, with increasing difficulty in respiration, and he died at 2 a.m. on the twelfth day after the accident.

Remainder of Family

The mother and three other children were suffering from acute conjunctivitis on admission. They all responded well to treatment with sulphacetamide and atropine, and their eyes were almost normal within a week.

One of the boys who had shared the patient's bed had blisters on the thigh and forearm, and during the next week these extended, his penis became blistered, and a well-marked erythema developed on the bathing-drawers area. A very troublesome cough started on the fourth day but soon cleared up. On the sixth day he vomited and complained of abdominal pain, about the same time that his brother also had acute pain due to a duodenal ulcer. The pain in this case, however, subsided in about 24 hours. Another boy, who also shared the bed, had acute conjunctivitis and developed blisters on the buttock and perineum that, although remaining clean, took eight weeks to heal.

Three other members of the family—girls aged 5 and 12 and a boy aged 2—were admitted about a week later with severe coughs and the two youngest developed a bronchopneumonic condition. These were in bed when the contaminated boy came home, and presumably were affected by vapour from the clothes the following morning.

Several members of the family showed a definite reduction in their white cell counts, which were taken on the tenth day. The majority were from 4,000 to 6,000 per c.mm., though one boy had a count as low as 2,800. In the course of a week all these counts increased by 2,000 or 3,000, coincidently with an improvement in the general condition.

Post-mortem Examination (Dr. Eric Gardner)

A well-built boy with extensive first-, second-, and third-degree burns on the body, some healed and the remainder healing satisfactorily.

Brain: 55 oz.—rather severe congestion superficially and on section. Pharynx congested. Membranous ulceration of larynx and membranous tracheitis and bronchitis, seen also in section of lung in larger bronchi with some peribronchial consolidation. Right lung: Lower lobe—massive collapse superficially, centre of lung aerated; upper lobe—similar to a less extent; solid oedema of lower lobe. Left lung: Similar condition of collapse but less extensive. Heart: Vessels, valves, and myocardium normal to naked eye. Stomach: Mucous membrane congested. Duodenum: Ulcer 1 cm. in length; ulcerated completely through mucous membrane on to muscular coat. Jejunum and ileum: Mucous membrane congested, fading out in ileum. Caecum: Area of ulceration finger-print size. Colon: Slight congestion. Liver: 36 oz.—smooth; terminally congested. On section, pattern blurred and surface glazed (cloudy swelling). Spleen: 4 oz.—swollen; firm and deeply congested. Kidneys: 8 oz.—deeply congested; surface veins prominent; capsule adherent in patches. Cortex—radial lines of congestion; pelvis congested and oedematous. Patches of congestion in ureters. Adrenal glands oedematous; bladder normal. Section of tibia: Red bone marrow pale; considerable pallor in head and upper end of shaft. Vertebrae, deep brownish colour on section.

Summary.—A membranous ulcerative laryngitis and a membranous ulceration of the main air tubes of the lung had led to a massive collapse of that organ—the immediate cause of death. Further changes were noted in the glands of the body and in the bone marrow, consistent with and consequent upon the changes in the blood. The cause of death was: (*a*) agranulocytosis; (*b*) multiple burns from mustard gas.

Summary of Microscopical Examination of Tissues (Prof. G. R. Cameron)

Severe pulmonary oedema and haemorrhage, with macrophage infiltration, acute desquamative bronchitis and bronchiolitis, slight peribronchitis—no bronchopneumonia; acute desquamative tracheitis with false-membrane formation; acute ulcerative laryngitis with false-membrane formation; acute ulceration of first part of

duodenum; cloudy swelling, congestion, cast formation in kidneys; cloudy swelling and early necrosis in liver; distension of spleen with red corpuscles; depletion of lymphoid tissue in spleen, mesenteric, inguinal, and pre-aortic lymph glands, with lymphoblastic proliferation; disappearance of granular polymorphonuclear leucocytes and myelocytes from bone marrow.

Comments

The outstanding features in this case are:

1. Terminal pulmonary oedema and haemorrhage, both of which appear to have developed within the last one or, possibly, two days of life, judged by the relatively slight cellular reaction in the lungs.

2. Acute bronchitis and bronchiolitis, which must be grouped with the laryngitis and tracheitis, since all show the same degree of inflammatory change and epithelial damage. These changes are of longer standing than the pulmonary oedema and haemorrhage, and are to be attributed to inhalation of mustard vapour.

3. Ulceration of the duodenum (and of the caecum) of some days' duration—probably at least a week; it is certainly not terminal.

4. Depletion of lymphocytes, with lymphoblastic proliferation, suggests a longer process—i.e., is not terminal.

5. Haemorrhages in the adrenals.

The mild degenerative changes and slight necrosis of liver and kidneys are difficult to separate from post-mortem change—a source of error which has to be seriously considered here, since the necropsy was delayed for about 30 hours. However, the presence of granular and "calcium" casts in the kidneys is evidence of some damage to these organs during life. These changes do not, however, suggest sulphathiazole poisoning if the findings described in monkeys with this drug (Climenko and Wright, *Arch. Path.*, 1941, **32**, 794) are applicable to man.

Discussion

In the boy's case the contamination was due partly to mustard vapour and partly to a mixture of liquid mustard and bleach powder. The contamination of the family was due to vapour given off from the boy's clothing, which was hanging in the living-room.

In the war of 1914–18 it was found that the majority of mustard gas casualties were due to *vapour*. These were caused not by inhaling the gas directly on the field of battle, but by a contaminated man going into a billet or dug-out, whereupon the liquid contamination on his clothing evaporated, resulting in a high concentration of vapour in a confined space, which caused many casualties indirectly among hitherto unaffected and uncontaminated men. This is well illustrated in the present case, for one individual was contaminated by liquid and seven others became vapour casualties indirectly. The obvious warning is, *Never take contaminated clothing into a confined space.*

Initial Symptoms.—Apart from the burning sensation of the skin in the contaminated boy, *vomiting* was the first symptom in all the patients. This is now well recognized clinically in mustard gas poisoning, and is followed a few hours later by irritation of the conjunctiva.

Burns.—The burns were chiefly of the first and second degrees. It does not seem to matter greatly what treatment is used for these, so long as attention is paid to *strict asepsis.* According to those who have had most experience, acriflavine emulsion, liquid paraffin, tulle gras, etc., will all give satisfactory results, and it is suggested that the treatment which is most readily available and understood by the nursing staff should be used. It is important to aspirate the blister fluid under aseptic precautions in the early stages, and to preserve as much of the blistered skin as possible. In this connexion amyl salicylate limits the effusion, but is expensive, is not always readily available, and is irritating to the scrotum and face; on the whole, therefore, it is not applicable to large numbers of cases. Fomentations should not be used, nor should tannic acid, as recent work has shown that when a large area of burnt skin is tanned there is a possibility of absorption of tannic acid, giving rise to liver-cell necrosis (personal communication from Prof. Cameron). That fresh patches of erythema and blisters continue to develop for seven to ten days is a well-established clinical fact, and is not, as is sometimes thought, due to reinfection. Healing of the burnt area is often very slow. One of the boys with a second-degree burn about 3 in. by 2 in. on the perineum took eight weeks to heal, although there was no secondary infection.

Eyes.—Miss Ida Mann, in a personal communication from the Nuffield Laboratory of Ophthalmology, classifies the clinical signs of mustard gas burns of the eyes into four grades as follows:

Group 1: Very Mild.—Lids and sometimes conjunctiva red, cornea clear. Sometimes slight oedema of the lids and lacrimation. No photophobia. No treatment required.

Group 2: Mild.—In addition to the above there is superficial corneal haze, lacrimation and/or discharge (profuse), photophobia and/or blepharospasm. Treatment consists in keeping the eye clean, using mydriatics and only non-irritating antiseptics. Do not bandage the eye; reassure the patient, as there is a large element of fear. Recovery should take place in one to three weeks, and is complete.

Group 3: Severe.—In addition to the above there is deep corneal haze—(a) without new vessel formation, (b) with new vessel formation. Treatment is on the same lines as with Group 2. The case takes several weeks to recover, and if Group 3 (b) there may be relapses and prolonged disability, with final recovery.

Group 4: Very Severe.—As above, but with iritis, copious and prolonged discharge, and inability to open the eyes for a period of weeks or months. Partial recovery follows in about nine months. There is a risk of ulceration following prolonged degenerative processes, occurring after five to ten years. Treatment is by mydriatics, cleanliness, and non-irritating antiseptics.

The present case would appear to fall into Group 2 or Group 3 (a). Discharge was not a feature and there was not much corneal haze. In all cases intensive irrigation is irritating and harmful. A non-irritating antiseptic would seem to be indicated when secondary infection is present. Mydriatics relieve the pain and spasm.

Trachea and Lungs.—Tracheitis is an early symptom, and should be relieved by inhalations. An irritable cough starts on the second to fourth day, and bronchitis or pulmonary oedema develops, or the condition gradually subsides in a few days. The usual remedies are applicable here.

Blood.—The obvious question of the cause of the agranulocytosis was whether it was due to the sulphathiazole, of which the patient had received 23 g., or whether it was due to the mustard gas. I understand from Prof. Cameron that this condition was recognized in the last war as an occasional sequela of mustard gas poisoning and that much experimental work has confirmed its importance. The post-mortem findings did not suggest that the agranulocytosis was due to the sulphathiazole, and the fact that some of the other cases which had no sulphonamide also showed a marked diminution in their white cell counts eight to fourteen days after the contamination strongly suggests that the mustard gas was the causative agent. The question naturally arises whether sulphonamides should be used in dealing with mustard gas cases, and investigation of this problem is urgently required. It is known that mustard has an affinity for lymphoid tissue, and the relatively greater proportion of this tissue in children may make them especially susceptible.

Intestinal Ulceration.—Ulcers of the duodenum are well known as a textbook complication of burns, although I believe they must be relatively uncommon. This is probably due to the fact that patients often die before the ulcer has time to develop. The symptoms of pain and tenderness on the right side of the abdomen with general distension were obviously due to the ulcer found after death. A similar ulcer was present in the caecum. Haemorrhage and acute ulceration of the mucosa are, however, commonly found in experimental mustard gas poisoning.

Convalescence.—Convalescence tends to be prolonged, and good nourishing food, with extra milk and especially an excess of vitamin C, is important. The vitamin C should be given in large doses of 500 mg. 12-hourly for three doses, followed by 50 mg. twice a day, proportionately less being required for a child.

I was fortunate in being able to call upon the expert knowledge of Capt. K. Hill, R.A.M.C., in treating these cases, and to have the opportunity also of discussing them with Prof. G. R. Cameron and Surg. Lieut.-Cmdr. G. Foss, R.N.V.R. My thanks are due to all of them for their expert assistance, to Miss Ida Mann for her classification of eye cases, and also to Dr. E. Gardner for his post-mortem report.

HEPARIN IN INTRAVENOUS INFUSIONS, INCLUDING PENICILLIN THERAPY

BY

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The general, if not the only, anticoagulant used in blood transfusions in this country and in the United States is sodium citrate (0.3 g. per 100 c.cm. of blood). It has proved very satisfactory. It is cheap, and has, it is believed, no deleterious effects. It is not here proposed that heparin should be substituted for sodium citrate, as has been advocated by Hedenius (1937), who administered enough intravenous heparin to give the donor's blood a coagulation time of about 30 minutes: he has used this method hundreds of times with complete success. Rather it is suggested that a very small amount of heparin be employed in addition to the citrate added to blood, or to an infusion of crystalloid solution if this is preferred.

Although there is no essential difficulty in administering either a transfusion of blood (fresh or stored), plasma, serum, or an infusion of crystalloid solution, it sometimes happens that the infused substance fails to run smoothly through the apparatus long enough to give the amount intended. This is generally due either to spasm or to a thrombosis of the recipient's vein. Spasm is seen particularly after dissection of the internal saphenous vein at the ankle, and can be relieved by placing hot-water bottles along the course of the vein; it is then often surprising how, in a few moments, the blood or solution will begin to run freely. We have all met with the patient who has had several transfusions and who, again requiring one, presents no suitable vein that has not been "used" and thrombosed. It is important that a vein should not be obliterated by a transfusion, and it should be possible to use the same vein an indefinite number of times. It generally is; it sometimes is not.

Why is it that sometimes everything works smoothly and there is no residual thrombosis, and at other times thrombosis occurs and the flow stops? The condition is generally due to a thrombotic process starting, presumably, at the site of venepuncture, or to an irritating solution being infused, such as is unfortunately common in intravenous penicillin therapy.

Prevention of Thrombosis

To counteract the incidence of thrombosis in the recipient's vein it is suggested that heparin, in an amount equivalent to 1 Toronto unit per c.cm., be added to the fluid to be introduced. G. Murray (1940) reported on the use of continuous intravenous heparin in over 400 cases without a single case of thrombosis at the site of venepuncture, even though in some instances the needle was left *in situ* for two weeks and though, as he was deliberately prolonging the coagulation time of the recipient's blood, he was using a concentration considerably greater than that suggested here. It may be argued that in a transfusion on account of haemorrhage, or in a transfusion being given during or immediately after an operation, the coagulation time of the recipient's blood is liable to be prolonged. Hedenius has shown that there is a threshold for heparin in the blood below which no alteration in the coagulation time is apparent. This threshold is 0.25 mg. per kilogramme of body weight. In a patient of 8 st. this would amount to 14 mg. of heparin, and in a patient of 10 st. to between 17 and 18 mg. Now, 1 Toronto unit of heparin contains 0.01 mg. of the substance; therefore a litre of blood or crystalloid solution heparinized with 1 unit per c.cm. would contain 10 mg. It will be seen that to reach the threshold it would be necessary to infuse 1½ litres in an 8-st. patient. As the amount of heparin contained in this 1½ litres is destroyed hourly by the body, and as it is very improbable that there would ever be an indication to carry on an infusion at the rate of 1½ litres an hour, it is concluded that the threshold is not reached, and therefore that the coagulation time of the recipient is not affected. This is borne out by the observation made in a few cases.

It might be said that there may be toxic effects of the heparin *per se* and that harm may result. Experimentally, Howell and McDonald (1930), in dogs, have been unable to show any change in the red and white counts or in the platelets, even where the animal's blood has been rendered incoagulable; and G. D. W. Murray (1940) has given to patients as much as 600,000 units over a period of 40 days without ill effect. Nor have anaphylactic phenomena been encountered where heparinization has been repeated.

We have recently used heparin in all infusions of blood (fresh or stored), plasma, and solutions of crystalloids. The heparin is added to the infusing fluid by injecting it through the cork of the bottle by means of a hypodermic syringe. The amount used has been 1 unit per c.cm. of fluid—equivalent to 1 c.cm. of heparin B.D.H. per litre. The infusion is then carried on in the usual way. We have not had to dissect a vein in this series, and this step should only very rarely be necessary.

Between 50 and 60 cases have received heparinized intravenous therapy, and most varieties of shock, haemorrhage, prolonged sepsis, and anaemic states have been included in this series. There has been no tendency to a recurrence of haemorrhage, and in post-operative cases we have seen no evidence of bruising or haemorrhage in the area of the operation scar. In 8 cases the coagulation time was estimated before infusion and immediately afterwards. In no case was there any significant alteration, the maximum rise in coagulation time being 30 seconds and the maximum fall in value 20 seconds, these variations in the value clearly being within the limits of the margins of error of the test. There has been no evidence of toxic or deleterious effects as a result of the heparin.

Use of Heparin with Penicillin

It is suggested that heparin should be of value in preventing the thrombosis and phlebitis which are frequently seen when penicillin is given by intravenous drip. Penicillin, or at least the impure solution of penicillin available at present, irritates the endothelium of veins, causing a chemical phlebitis and a subsequent thrombosis. However, G. D. W. Murray (1940) has found experimentally that the incidence of phlebitis and thrombosis caused by the intravenous injection of sodium ricinoleate—a powerful intravenous irritant—can be reduced from 90% in controls to less than 20% in heparinized animals. According to Surg. Cmdr. C. A. Green (personal communication), penicillin is not destroyed or affected by heparin. We have in several cases employed heparin with penicillin to try to prevent thrombosis or thrombophlebitis. At first we used 1 unit of heparin per c.cm. of penicillin solution, and in five cases the full amount of penicillin was given without thrombosis, but in one the drip blocked after four and a half days. In a second batch of penicillin 1 unit of heparin per c.cm. did not suffice to prevent thrombosis, so 3 units per c.cm. were used. With this dosage it has been possible to give the required amount of penicillin without accident. At the rate of penicillin drip which we are using—i.e., 35 drops a minute—it would not seem possible to administer enough heparin to affect the clotting time.

Conclusion

Apart from difficulty with the penicillin cases, infusion has been conducted with noticeable ease in every case except one. This patient was receiving fresh heparinized blood for a secondary anaemia and toxic state following prolonged suppuration. In this instance the needle was not inserted fairly into the vein and there was leakage into the perivenous tissues. After the needle was inserted into the other arm all went well, and an infusion of 4 pints of blood was successfully concluded. The original vein did not thrombose.

In no case has thrombosis of the recipient vein been seen, nor has there been any bruising of the tissues around the site of puncture. Objection to the use of heparin in infusions has been raised on the question of cost. At present heparin B.D.H. costs 8s. 6d. for 5 c.cm., which contains 5,000 units—enough to heparinize effectively 5 litres of blood, plasma, or other fluid. A cost of approximately 1s. 8d. per litre cannot, therefore, be regarded as excessive when the advantages of the method are considered.

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Medical Memoranda

Solitary Neurofibroma in the Stomach

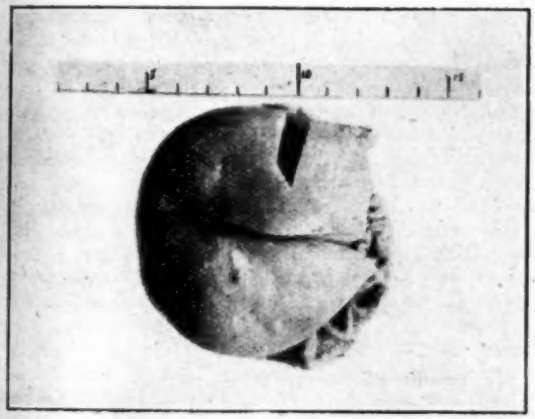
In the stomach, and generally in the digestive system, benign tumours, especially neurofibromata, are seldom seen. These tumours always take their origin from the gastric plexus and grow between the two layers of muscle below the mucosa. According to Askanazy, the nerve tissue seen within the tumour is sympathetic. Usually such tumours are associated with a diffuse neurofibromatosis of the skin. Leriche, and Gerhardt and Westphal, have reported numerous neurofibromata of the alimentary tract in patients with typical von Recklinghausen's disease. Kohtz described an intestinal neurofibroma in a patient with no other signs of neurofibromatosis; and Askanazy writes of a case in which the stomach and small intestine contained as many as 15 neurofibromata, the largest being the size of a walnut. Despite a search of the available literature, I have not found a previous report of an isolated neurofibroma of the stomach. The following case, in which the tumour was larger than any gastric or intestinal neurofibroma hitherto recorded, may therefore be of interest.

CASE HISTORY

On July 2, 1943, a woman aged about 50 was admitted to hospital in a very weak condition. She complained of nausea and occasional vomiting. According to her story, she was taken ill suddenly, a year previously, with violent abdominal pains, and ever since that time had suffered from prolonged, but not severe, abdominal pain with a sensation of gastric distension.

On examination the belly was soft and not resistant. A hard mobile tumour the size of a fist was felt in the centre of the epigastrium. The tumour moved with respiration. On *x*-ray examination a fairly regular filling defect was seen towards the middle of the stomach. Radiographs showed a large, irregular, and somewhat rough shadow. Nothing unusual was noticed in the intestinal canal. A provisional diagnosis of pedunculated tumour or a phytobezoar was made, and it was decided to operate.

On July 10 laparotomy was performed under local analgesia, and at the middle of the lesser curvature a smooth round tumour about 3 in. in diameter, covered with mucous membrane and attached by a short broad pedicle, was seen. The tumour was resected, and the wound healed by first intention. The patient speedily recovered strength and was soon herself again. On July 30, 1943, she returned to her home.



Pathological Examination (Prof. Oberdorfer, Cancer Institute of the University of Istanbul).—A round solid tumour, the size of an apple, weight 200 g., covered on all sides by mucous membrane and with a small broad pedicle, which had no mucosal covering. On section the tumour was seen to be of whitish medullary tissue, clearly distinct from the mucosa. Histological examination showed that the mucous membrane of the tumour was partly atrophied and partly degenerated by inflammation. The muscularis mucosae was somewhat thickened, and both under the mucous membrane and within the muscularis mucosae the infiltration of spindle-cell elements with especially elongated nuclei was clearly seen. Among these cells was a plexus of corrugated and sometimes parallel fibrils. Particularly in the neighbourhood of small vessels, of which there were many, there was a tendency to orderly arrangement of cells. Near the mucosa there was a considerable inflammatory infiltration, consisting chiefly of plasma and eosinophil cells. Fibroma and myoma were excluded by the histology of the tumour, and a diagnosis of neurofibroma was made.

After the pathological report had been received the patient was given another thorough examination, and neither on the skin nor on other parts of the body was anything found to indicate general neurofibromatosis. This case must therefore be accepted as an isolated neurofibroma of the stomach.

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Herpes Zoster with Underlying Pleural Rub

The following case is of interest because it illustrates one difficulty which may be encountered in the differential diagnosis of pleurisy. It is well recognized that pre-herpetic pain may be mistaken for pleurisy of pulmonary origin, but in this case of herpes there was in addition a pleural rub.

A woman aged 46, with a 20-years history of asthma and bronchitis, was admitted to hospital complaining of three days' pain in the left side of the chest on deep respiration and coughing. During the previous month her cough had been worse, with green and yellow sputum, but no haemoptosis. She was afebrile, pulse 80, respirations 20. Physical examination showed no abnormality except rales over the whole chest and tenderness over the seventh and eighth intercostal spaces in the posterior axillary line on the left side. No pleural rub was heard at this time. Radiographs showed evidence of chronic bronchitis, but no abnormality in lung or in pleura in the area concerned. On the fourth day after admission a small crop of typical vesicles of herpes zoster appeared over the tender and painful area. Three days later a pleural friction rub appeared, directly underlying the herpes. The rub persisted for several days, gradually diminishing in intensity, and was not heard after the fourth day. The pain disappeared at the same time, but the vesicles healed slowly, with scarring in the usual manner. No other evidence of pulmonary or pleural involvement appeared, and she was discharged two weeks later. The blood sedimentation rate remained throughout within normal limits.

The interest of this case lies in the coincidence of the herpes with underlying pleural rub, and it was thought that this was due to herpetic lesions occurring on the surface of the parietal pleura. A similar case was reported by W. R. Brain (1932, 1940). It appears to be uncommon for a pleural rub to be heard with herpes zoster.

We wish to thank Dr. N. G. Hulbert for his help and for permission to publish this case.

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Perforated Solitary Diverticulum of Caecum

Diverticulosis is a common condition of the large bowel, and much has been written about it. The condition was described by Cruveilhier in 1849, and in 1858 a case was reported to the Pathological Society of London (Jones, 1858–9). Since that time many statistics have been published. Generally speaking, the results show that diverticulosis and diverticulitis are rare under the age of 30, that they predominate in men, that they are usually confined to the distal half of the large intestine, and that single diverticula of the caecum are very rare. The case presented is that of a girl of 17 with a solitary diverticulum of the caecum which had become acutely inflamed and had perforated, giving rise to an "acute abdomen."

CASE HISTORY

The patient had had rheumatic fever twice in 1937 and once in 1938, but no previous attacks like the present one (Nov., 1942). Twenty-four hours before admission to hospital she had a sudden acute pain in the right iliac fossa and vomited shortly afterwards. The pain continued increasing in intensity up to the time of admission, and she vomited twice more. Menstruation was imminent, and the patient suffers from dysmenorrhoea. Examination showed her to be a well-built, apparently robust girl; tongue dry, pulse 112, temperature 100. There was nothing abnormal in the chest. The heart was not enlarged; mitral first sound roughened, pulmonary second sound accentuated. The abdomen did not move well on respiration. Tenderness was marked in the right iliac fossa directly over the caecum. Guarding was present. No mass was palpable. A diagnosis of acute appendicitis was made, and laparotomy was done.

Operation.—The abdomen was opened through a McBurney incision, and on opening the peritoneum free faecal matter was seen lying over the caecum. The cause of this was found to be a perforated diverticulum on the lateral side of the caecum. The diverticulum was cone-shaped, and the base was about half an inch across. This area was acutely inflamed, and at the tip there was a perforation about the size of a split pea. The edges of the perforation were sutured and invaginated with two further rows of sutures. The wound was cleaned, and gloves and towels were changed. The appendix was normal, but it was removed. Sulphanilamide suspension was injected into the peritoneal cavity, and the wound was closed with drainage.

The patient made an uninterrupted recovery, and 15 days after operation a barium enema was given. The report was: "Apparently normal colon." The patient was discharged. Five months later a further barium enema was given. The report was: "Rectum and colon as far as caecum distended with barium. Large gut fills easily and slides up and down in ascending colon, leaving no pockets of barium. *Supine:* Some segmentation of barium, but not pocketing. No abnormality detected to-day." The following day: "Apart from a small amount of barium in the ampulla of rectum all the barium has been evacuated spontaneously—i.e., large gut is functioning well and without any disability whatsoever."

Two weeks later the patient came up complaining of a sudden onset of numbness and tingling in the right hand. There was pronounced tenderness over the roots of the fifth, sixth, seventh, and eighth cervical nerves. This responded rapidly to short-wave therapy, and the patient has been perfectly well since.

COMMENT

The case is unusual in view of the age of the patient and the nature of the lesion.

(*a*) *Age.*—Diverticula may be either congenital or acquired, and in this case, in view of the patient's age, the absence of the usual predisposing factors, and the broad neck, it is concluded that it represented one of the congenital type. Congenital diverticula have been described in ages down to 6 years (Hartwell and Cecil, 1910), but they are very rare: in 10,167 necropsies none were seen (Fifield, 1927).

(*b*) *The Nature of the Lesion.*—Cases of solitary diverticula of the caecum (Gabriel, 1937; Gordon-Taylor, 1938) and of perforated diverticulitis of the caecum simulating appendicitis have been reported (Fifield, 1927; Pereira, 1927), but these were of the typical indurated type in which differential diagnosis from carcinoma can only be made histologically after removal, or of the acquired type in which acute inflammation has supervened in the early stages and the narrow neck was ligated and the diverticulum removed. I was fortunate enough to see an example of the latter type, before any inflammatory changes had taken place, while operating on a ruptured ectopic pregnancy. There was a small diverticulum in the lateral wall of the caecum with a narrow neck, which was readily reducible. The remainder of the large bowel appeared free from diverticula.

The question arises, Why should this virulent infection occur in this one wide-necked congenital diverticulum? I do not attempt to answer this, but one wonders if the rheumatic condition played any part.

I wish to express my thanks to Mr. G. F. Stebbing and Dr. W. G. Evans for the radiological reports.

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Definitive Hosts of a Species of Diphyllobothrium causing Mass Infection of Trout in Reservoirs: Preliminary Note*

The reported infection of the trout in a South Wales reservoir with plerocercoids of a tapeworm of the family Diphyllobothriidae (Duguid and Sheppard, 1944) has stimulated interest in the subject. The naturally infected definitive host in this outbreak was not identified. It has been suggested that the movements of population from endemic Scandinavian areas brought about by the war may have caused the spread of infection through the agency of man (*Lancet*, 1944).

In investigating an epizootic in the Dublin district it has been found that sea-gulls and cormorants from the area are infected with an adult tapeworm of the genus *Diphyllobothrium*. In our opinion these birds are the naturally infected definitive hosts of the parasite in this district. Trout from reservoirs near Dublin are heavily infected with plerocercoids of the family Diphyllobothriidae. Specimens showing all degrees of a gradual development from the typical plerocercoid as found in the fish to the fully developed tapeworm were present in the intestines of greater and lesser black-backed gulls (*Larus marinus* and *L. fuscus*), herring-gulls (*L. argentatus*), and cormorants (*Phalacrocorax carbo*).

So far as we can ascertain, the fact that gulls and cormorants act as definitive hosts of a species of *Diphyllobothrium* which in its plerocercoid stage occurs in fresh-water fish has not previously been recorded in these islands.

Investigation of the infection at Poulaphuca reservoir, near Dublin, is proceeding, and fuller details will later become available.

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Reviews

THE ENDOCRINE SYSTEM AND SEX

Endocrine Man. A Study in the Surgery of Sex. By L. R. Broster, D.M., M.Ch., F.R.C.S. With foreword by Sir Peter Chalmers Mitchell, D.Sc., F.R.S. (Pp. 144. 12s. 6d.) London: William Heinemann. 1944.

The misuse of endocrine therapy, too often seen in the recent past, could only be countered by exact experiment and a broad biological outlook. Mr. Broster's work on the adrenogenital syndrome has made him a recognized authority on the experimental and clinical aspects, and now in *Endocrine Man* he places his results in their appropriate position against the general biological background. He aims to do so in a way which he hopes is "not too technical for the keen and intelligent layman with a knowledge of general science." How far he has succeeded in this it is perhaps easier for the lay rather than the medical reader to assess; certainly there is plenty to interest the latter. The broad thesis is a consideration of the "instinctive tripod": tropisms, and the autonomic nervous system lying below the threshold of consciousness, and cerebral control which is associated with it. Instinct in its turn is defined as "inherited modes of reaction to bodily need and external stimulus"; one of the main pillars upon which the whole edifice of life has been constructed. Unlike the nervous reflexes, which are local and instantaneous, the instinctive responses are delayed, more complex, and influence the body as a whole. Delicate nervous impulses more and more become the rapid instrument of instinctive expression; and, although they multiply and increase its range, it is not reasonable to suppose that they entirely supplant the more primitive chemical tropisms. Indeed, Dale's work proves the contrary. The biology of the primitive instincts of growth, self-preservation, and reproduction are then discussed in some detail.

Coming next to his special topic Mr. Broster takes the view that, though the sex-determining mechanism normally depends on the chromosomes, this can be overridden by other factors. There is a male phase even in the female foetus, and over-activity of the adrenal cortex during that phase may upset the original female genetic bias. Since abnormal behaviour on the part of one gland upsets the balance of the others, the original genetic pattern may become obscured by polyglandular interaction. Though the pituitary, in Langdon-Brown's phrase, is "the leader of the endocrine orchestra" in post-natal life, the author thinks that during foetal life the adrenal cortex acts as leader. The functions of the individual endocrine glands are next considered with special reference to the light they throw on the problems of intersexuality.

Symbiosis and parasitism are discussed on the broader biological basis, and applied to "Siamese" and included twins, teratomata and new growths, as well as the occasional hostile parasitism shown by the foetus towards the maternal tissues. The final section, on the nature of man, deals with his evolution, attributing his rise to a somewhat sudden development of a brain which is giving him increasing mastery, though this form of control has masked but not mastered his animal instincts. The nervous and endocrine systems have been integrated and cannot be separated in a way which has hitherto been the method of their study, for each is dependent on the other.

This in briefest outline is the argument of a thought-stimulating book, covering a large field. The utilization of a central theme from which the argument develops is an attractive idea, and presumably represents the development of the author's own thoughts on the subject.

INDUSTRIAL MEDICINE IN THE U.S.A.

Essentials of Industrial Health. By C. O. Sappington, M.D. (Pp. 626; 63 illustrations. 42s.) Philadelphia, Montreal, London: J. B. Lippincott Company. 1944.

It is difficult to compare British problems of industrial medicine with those of the U.S.A., largely because they have no comprehensive national scheme of legislation such as our Factories Act. Each of the 48 States has its own special department concerned with labour and conditions of work. As a result there is wide variation in health provisions for the worker and lack of universal standards. The absence of an America

National Health Insurance system makes the duties of the industrial medical officer and his ethical relationships with the general practitioner frequently at variance with accepted practice in this country. But the fundamental reasons for the existence of a health service in industry are similar—the care of the worker's health at the place of work by every possible means.

This book is different from others on the same subject which have recently come from America: it is the product of one writer. There is editorial sense of proportion and balance not found in similar textbooks written by groups of experts. While the author surveys the field widely—incidentally making few references to significant research work in this country—he nevertheless gives a wealth of detail on many important subjects, which obviously come from extensive personal experience over many years. Job analysis in relation to capacity for work and pre-placement medical examination, to take two important examples, are discussed at some length. Neither of these subjects has been sufficiently studied in this country. In chapters on industrial health exposures and hygiene Dr. Sappington comes to the crux of industrial medicine—the need for the factory doctor to have an intimate knowledge of his industry and its different occupations, with a view all the time to prevention of accidents and ill-health. Obviously it is the author's view that occupational disease, though vitally important to workers in a few specialized industries, is not by any means a synonym for industrial medicine.

Any problem concerned with industry is difficult to divorce from wartime measures. The remarkable growth of American industry in its change-over to products for war created a demand for more doctors for the factory; but, as here, these doctors have largely been appointed to the big concerns. The U.S. Census of Manufacturers in 1937 showed that out of 166,794 different manufacturing plants 160,245 employed 250 or fewer wage earners; and out of 8,769,231 workers in these plants 3,810,626 worked in establishments employing fewer than 250 persons. This proportion compares closely with British figures, and shows that the difficulty of providing medical supervision on any comprehensive scale is similar. One important lesson learnt from reading this book is the urgent need for an authoritative British textbook of industrial medicine. In this respect we lag behind.

SULPHONAMIDE TREATMENT

Sulfonamide Therapy in Medical Practice. By Frederick C. Smith, M.D., M.Sc., F.A.P.S. Foreword by George Morris Piersol, M.D. (Pp. 368; illustrated. $5.00.) Philadelphia: F. A. Davis Company. 1944.

The time has not yet come for a definitive work on this subject: each that appears has an ephemeral value in being up-to-date, but is liable to supersession from that point of view within six months. If comprehensive enough, it will retain its value rather longer as a source of information about the treatment of less common conditions. Frederick C. Smith's *Sulfonamide Therapy in Medical Practice* differs from other similar books in its arrangement. After an introductory section, mainly on pharmacology and methods of administration, it deals alphabetically with diseases and their treatment with sulphonamides, starting with abscesses and appendicitis and finishing with urology and wound infections. At first sight this policy appears contrary to the most fundamental principle in this form of therapeutics—that one should treat not a disease but an infection by a particular micro-organism. Although this principle might well be more strongly emphasized in the text, it is not disregarded, and the arrangement chosen is perhaps justified on the score of ready reference and the direct applicability of the information to the individual diagnosis.

Different conditions are discussed rather unequally: there is naturally a long section on pneumonia, and very short ones on atelectasis, filariasis, nephritis, and smallpox; but that on mastoiditis, consisting of 13 full case histories illustrating the author's contention that a mastoid wound can be closed without drainage if the cavity is filled with sulphanilamide or sulphathiazole, is disproportionately long. On the other hand, the section on gas gangrene is quite inadequate, citing only experimental evidence, with no indication that there is any published clinical experience to support it, although the first item of this nature appeared in a well-known American journal seven years ago. In spite of such defects, which are perhaps inevitable in any attempt to deal in this way with so vast a subject, and of a somewhat superficial outlook, this book will be found a useful source of information. There is a brief appendix on penicillin.

PAEDIATRIC HISTORY

Pioneers of Pediatrics. By Abraham Levinson, B.S., M.D. Second edition, revised and reset. (Pp. 119; illustrated. $2.00.) New York: Froben Press.

Under the title of *Pioneers of Pediatrics* Dr. Abraham Levinson has traced the history of this branch of medicine by means of short biographical sketches. It is a method which makes for easy reading; the author writes in an attractive style, and he has collected a large number of well-chosen portraits to illustrate his text. Towards the end of the book he turns to what more resembles a history of disorders, for there is a chapter on "Investigators of Alimentary Disturbances in Infancy" and another on "Pioneers in Infant Feeding." In the latter some mention might have been made of the late Eric Pritchard. Indeed, British paediatricians of the past deserve rather more space. Cheadle is dismissed in three lines in company with Möller, and is erroneously credited with confusing scurvy and rickets. And there is no mention of John Thomson or Samuel Gee. In France Armand-Delille gets three lines, but there is no account of Marfan or Nobécourt. Of the American pioneers there is a fuller account, and the author, in any case, disclaims any attempt at presenting an exhaustive treatise. It is an attractive little volume, but the absence of an index is a pity.

Notes on Books

The exiled Poles who have come to this country since the war began have succeeded to a remarkable degree in making known among British people the science and learning of their country. In this they have been assisted, so far as medicine is concerned, by the foundation of a Polish Medical School within the walls of Edinburgh University and by the establishment in Edinburgh of the Paderewski Hospital. These enterprises, together with much else about Polish medicine, are described in one of a series of booklets entitled *Polish Science and Learning*, edited by the Association of Polish University Professors in Great Britain (Oxford University Press; 2s. 6d.). Here will be found articles by Polish doctors on medical education in Poland, Polish hospitals and sanatoria, the State Institute of Hygiene, the Polish system of social insurance, and the epidemics in Poland between the two world wars. The booklet includes also a full report of the Polish Committee of Health, set up by the Ministry of Labour and Social Welfare to deal with the problems of reconstruction. This report was the theme of Prof. Jurasz's recent Lloyd Roberts Lecture at the Royal Society of Medicine (*Supplement*, July 22, p. 18), but it is interesting to have a full account of the manner in which a Government in exile is anticipating in detail the health services which it hopes to institute on its return. The whole issue is full of ideas of reconstruction, and it is evident that the spirit of Copernicus, who was an economist and statesman as well as the father of modern astronomy, is stirring in a nation "which in the course of its history," as one of the writers says, "has risen again and again after the most dreadful ordeals to play a constructive part in the march of mankind."

Preparations and Appliances

HOT-AIR STERILIZER

Sterilization by hot air at 150 to 160° C. is required for certain powders and oils and is the best method for glass apparatus, including all-glass syringes: it also has some advantages for surgical instruments. A suitable oven for this purpose is rarely available in surgical units, whose staffs may therefore be interested in the "Stellex" Hot Air Sterilizer, of which we have received particulars from the manufacturers, C. H. Blackburn and Co. Ltd., 10, Gray's Inn Road, London, W.C.1. This apparatus is made for heating by gas, electricity, or internal spirit burners, the last-named having the advantages that sterilization temperature is reached very rapidly and that operation is still possible when for any reason electricity or gas is not available.

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THE HEARING AFTER OTITIS MEDIA IN INFANCY

In the treatment of acute otitis media, a potentially dangerous disease, attention has always been centred on achieving arrest of the inflammatory process in order to avoid the possible complications rather than to preserve the hearing. Naturally, danger to life is the first consideration, but the restoration of hearing is also important, and in more recent years this functional objective has not been neglected in the preoccupation of saving life. It is, however, commonly supposed that if the surgical treatment is satisfactory—by which is meant that the suppuration ceases and the tympanic membrane heals—the hearing will also be good, whether the treatment has been conservative or operative. But this seems to be largely a clinical impression unsupported by systematic testing of the hearing after recovery in a series of cases. On the other hand, as Nils Lundgren[1] points out, impaired hearing in children, as well as in many adults, is generally thought to be due to a previous attack of otitis. When observations have been made the hearing has been tested usually with the whispered voice unchecked by audiometric examination, or reliance has even been placed on the statement of the patient only. Bunch and Grove[2] examined audiometrically, between the ages of 7 and 16, a group of children who had had severe or recurrent attacks of otitis before the age of 5. Appreciable loss of hearing was found in 19%. This is one of very few such systematic examinations with the audiometer, and gives no information concerning the effect of treatment, whether conservative or operative, upon the preservation of hearing.

Generally, an operation which conserves the middle ear is recommended for a purulent otitis media which has not subsided at the end of four weeks; but there is no unanimity about this, and some have been inclined to recommend operation much earlier. This attitude, which had a number of supporters about ten years ago, is no longer the fashion, and the analogy with appendicitis is quite false. Early operation is therefore reserved for cases in which the threat of impending complications makes it urgent. Observations which Nils Lundgren has made were planned to elicit the influence which the line of treatment adopted, whether conservative or operative, may have on the hearing, and also on the relation between the duration of the otitis and the hearing. The investigation was based on a follow-up of 448 children up to the age of 3 who were treated for acute suppurative otitis media at Lund in the clinic of Prof. Dohlman during the period 1930–6. The follow-up was conducted during the years 1942–3, so that the children had reached at least 7 years of age and were therefore able to co-operate in a reliable audiometric examination. The number of ears concerned was 709, of which 102 were on the right side, 85 on the left, and 261 bilateral. Conservative treatment was applied to 618 ears, and the simple mastoid operation was performed on 91. Of the 448 children treated 320 were re-examined (71%), and of the 709 ears treated 507 (72%) were re-examined. Cases of otitis due to tuberculosis, diphtheria, and scarlet fever were excluded from the survey. It soon became clear that impaired hearing was rare after an otitis of short duration, and the cases were therefore divided into two classes: of short duration—that is, of less than five weeks—and of long duration—that is, five weeks or more. It is to be noted that the hearing defects recorded are not necessarily due to the primary attack of otitis, but sometimes to recurrences also, which occurred in 129 cases (31%). Conservative treatment had been applied to 265 of the children re-examined, representing 413 ears, and of the 91 cases of mastoid operation 63 were re-examined.

In non-recurring otitis 223 cases (78%) were found to have normal hearing, and 61 (22%) had hearing defects. An analysis of these cases showed that the majority of the short cases of otitis recovered good hearing, and that the incidence of impaired hearing increased with the lengthening of the course of the attack. Thus in attacks lasting three weeks or less the incidence of hearing defects later was about 5%. For periods of four and five weeks the incidence rose to 19%, and there was a still higher rise after that. In 129 cases of recurrent otitis good hearing was found in 67 cases (52%). Here again the recurrences of short duration showed better hearing than those of long duration, and an analysis revealed that the short recurrences did not influence the incidence of impaired hearing. Thus the incidence of impaired hearing in the recurrent cases of otitis was 48%, compared with 22% in the non-recurring group.

The figures also support the general opinion that myringotomy has a favourable influence on the duration of the disease, as in 58% of cases subjected to myringotomy the duration was one to three weeks, as compared with 29% for spontaneous rupture. The figures also indicate that the tympanic membrane regained a normal appearance in most of the short cases of less than three weeks' duration, whilst the number of cases showing deformity of the tympanic membrane increased with the duration of the otitis. In non-recurring otitis there were persistent perforations in 3% of cases, whilst in recurrent otitis this figure rose to 12%.

In 709 ears with acute otitis the simple mastoid operation was performed 91 times, or in 13%. Re-examination of 63 of these cases showed that 30 of them (48%) have had recurrences, compared with 31% for the cases treated conservatively, though all were soundly healed at the time of the re-examination. Of the 63 cases 32 (51%) gave a normal audiogram, whilst 31 (49%) had hearing defects which were more common in the older children. In 41 of the 63 cases subjected to operation this was performed within five weeks of the onset, and good hearing was found in 25 and hearing defects in 23. On the other hand, in the 15 cases in which the discharge had lasted for five

[1] *Acta oto-laryngol.*, Suppl. 53, Lund, 1944.
[2] *Ann. Otol. Rhinol. Laryngol.*, 1930, 39, 1.

weeks or longer, with an average of seven weeks, there was full recovery of hearing in 7 cases and hearing defects in 8, but most of these hearing defects were much greater than those in the former group. Thus in the 63 cases subjected to the mastoid operation hearing defects were discovered by audiometry in nearly 50%, and in 19% these defects were gross enough to be discoverable by the whispering test. This percentage of hearing defects after the simple mastoid operation contrasts with the statements commonly made that as a rule the hearing returns to normal after this operation.

In comparing the results of conservative treatment and the simple mastoid operation certain difficulties arise. The cases treated conservatively must include a proportion of mild cases which heal quickly in three weeks or less, whilst those treated by operation include cases of extensive disease with more or less serious changes in bone. It is clear, too, that a case of otitis which heals in four weeks under conservative treatment is not comparable with a case subjected to operation in the fourth week, as the healing process in the ear in the latter case must last some weeks longer. A more useful comparison, therefore, can be made by estimating what happens after about five weeks or longer, keeping in mind that after five weeks the percentage of impaired hearing in conservatively treated non-recurring otitis rises steadily, and is nearly identical with that of recurring otitis. The average in these cases gives 51% of good hearing, which is the same (51%) as the average for good hearing after the mastoid operation. It appears from this that operation is the best form of treatment if the suppuration has persisted for six weeks without showing signs of improvement at the end of four or five weeks, for impairment of hearing is more severe where the suppuration has persisted for five weeks or more before operation. The best prospect, therefore, of recovery of good hearing is to perform the operation before the suppuration has continued for more than five weeks.

The author has analysed his figures in greater detail than can be given here, and they have yielded important information on other points; but they give concrete support to the clinical impression that the mastoid operation should be performed late but not too late, and that a vast number of the hearing defects found in adult life have their origin in childhood.

CIVILIZATION AND MEDICINE

Once man turned from merely being a food-hunter to becoming also a food-producer, civilization could begin. But its course has been interrupted and powerfully deflected by recurrent war, pestilence, and famine. Moreover, civilization itself has played a part in the propagation of disease. Prof. H. E. Sigerist, well known as an authority on the history of medicine, has traced out some of these interactions in a fascinating way.[1] It was hunger in addition to their characteristic aggressiveness which drove the Germanic tribes westward to destroy the Roman Empire. It was plague that changed Justinian's empire from Roman to Byzantine Greek, wherein Constantinople remained static for nearly a thousand years. It was the Black Death that changed the face of Europe and cleft the Middle Ages in twain. But this great disaster nevertheless played an important part in clearing the way for the rise of a new economic order, and incidentally killed off nearly all the lepers, who thenceforward ceased to be a social problem. This epidemic, by the way, was not called the Black Death, as here stated and generally believed, because of the lividity of sufferers from the haemorrhagic type: that name was only given by later centuries; for contemporary writers it was the "Great Death." When Sir Arthur Shipley said the struggle for supremacy between insect and man was still in doubt he was not jesting. The mosquito has laid fertile fields desolate, has sapped the vitality of nations, and is still a world problem. The rat flea has slain its millions by plague. Charles V overthrew Francis I and sacked Rome, only to be defeated in his turn by the louse at Naples. Apart from such vectors, human carriers of typhoid fever and dysentery have brought wars to an inglorious end. The advance of medical science has changed all that, so that wars can now be fought out to a more bitter finish.

Until the Industrial Revolution population did not change much in density, and it found authority unable and unwilling to face the new problems thus created. Yet as long ago as 1700 Ramazzini had called attention to the importance of industrial diseases. Apart from this, a low standard of living, poor housing conditions, and lack of food and clothing and fuel have always been major causes of disease. Tables of mortality, grouped according to income level, bring that out clearly. Nor, as Dr. Sigerist shows, is that simply due to an inferior earning capacity of the incompetent. In the depression in the U.S.A. between 1929 and 1932 the disability from disease increased in accurate proportion to the fall from the previous income level, whatever the social class.

Dr. Sigerist develops in an interesting way the evolution of medicine through magic, religion, and philosophy towards a scientific basis. So long as disease and death were regarded as imposed by external agents, human or divine, magic seemed the logical antidote. From the belief in the mystical properties of herbs a number of useful remedies were empirically discovered. Religion brought in the idea of disease as a punishment for sin, for which sacrifice and penance were the appropriate penalties. Magic and religion mingled in such superstitions as touching for the King's Evil, a corollary to the doctrine of the divine right of kings. It originated in France, and Dr. Sigerist states that Henry I was the first English king to practise it. But Sir Raymond Crawfurd traced it back to Edward the Confessor, whom he regarded as more Norman than Anglo-Saxon. The influence of religion was undoubtedly responsible for the care of the sick and suffering; previously hospital services, apart from ancient Greece, were reserved for the soldiery. By philosophy Dr. Sigerist apparently means the basing of medical practice on some theoretical conception. Thus, the doctrine of signatures, in addition to its magical aspect, maintained that similarity of structure in a plant to the diseased organ indicated the appropriate cure. The doctrine of humours also falls into this class. Thus Galen in main-

[1] *Civilization and Disease.* Oxford University Press. (22s. 6d.)

taining that a disease which was hot and moist was to be cured by drugs that were cold and dry was a true "allopath" in the way which we, despite the homoeopaths, are not. Iatrochemists and iatrophysicists were similarly chained to a formula.

The scientific study of medicine began with Vesalius and his anatomy, to be followed by Harvey's application of physics to physiology. Yet in the seventeenth century disease was still interpreted in the traditional philosophical way, until Morgagni related disease to a lesion in some organ. From the organ, pathology proceeded to investigation of the tissues and then of the cell. Meanwhile, therapeutics lingered until the study of function and of invasion by various types of parasites led to new pharmacological conceptions. That all this led to a too materialistic view is now realized, and in the development of psychotherapy, not divorced from religion, Dr. Sigerist hopes much. Incidentally his analysis of tarantulism as a mass neurosis is full of interesting information. The crisis through which civilization is now passing he sees as the result of technology outrunning sociology; in that process medicine has shared. We have built ingenious machines but not the requisite social and economic organization to match. We have developed rapid transport without methods of peaceful co-operation between nations. The machine age calls for social and economic adjustments, not just in the medical world but everywhere. The health and welfare of every individual are the concern of society, and the conclusion is that human solidarity, beyond the boundaries of nationality and race and creed, is the true criterion of civilization.

FURTHER NOTE ON PENICILLIN PRODUCTION

Two recent articles in American chemical engineering journals[1 2] give an illuminating picture of the effort that has gone to produce the penicillin now being used so extensively for the Allied Forces and to which we referred briefly in a recent annotation. In reviewing these two articles we are not unmindful of the contribution to the common store that has come from this side of the Atlantic, but, for reasons that will appear later, British production is at present only a fraction of the American. Pure sodium penicillin has a strength of 1,650 Oxford units per milligramme. The therapeutic concentration of penicillin—i.e., the strength required to check bacterial growth in body fluids—is 200 units per litre, or less than one-eighth of a milligramme. The maximum concentration of penicillin in the original culture media used to grow the mould was about 2,000 units, or 1 mg. per litre. At least half of this was lost in the process of concentration and extraction. Penicillin is extremely labile, and easily destroyed by heat, contamination by bacteria or moulds, and traces of metals or foreign chemicals. It can be preserved only under dry sterile conditions. The difficulties were so great that it seemed doubtful whether penicillin ever could be produced on a commercial scale. The decision to try to manufacture penicillin involved the expenditure of millions of dollars, and at the time the decision was made, in 1940 and 1941, the sceptic might well have doubted whether the drug was worth the trouble.

Fortunately the discovery was fairly early made that the yield of penicillin could be increased tenfold or twenty-fold by adding corn-steeping liquor to the medium on which the mould was grown. The next step was to apportion available resources most wisely between the three different methods of growing the mould—surface culture, submerged culture, and culture on bran. Surface culture, in which the mould is grown on the surface of a thin layer of medium in flasks or milk bottles, is the original laboratory technique. It has the advantage of being relatively foolproof, but the disadvantage of requiring a vast amount of space and labour. To process 10,000 gallons of medium requires as many as 100,000 or 125,000 bottles, which is a several days' run in even the largest of the plants. In the submerged process the mould is grown in tanks containing several thousand gallons of medium; the difficulties of aerating and agitating these large volumes of fluid without allowing contamination to occur are immense, and they have taxed human ingenuity to the utmost. In the bran process the mould is grown on the surface of moist bran in trays or drums. The difficulty here is that bran is a poor conductor of heat. It is therefore difficult to sterilize the bran initially and difficult to dissipate the heat that is produced by the fermentation process. When the fermentation cycle is complete the penicillin still has to be harvested. The concentration is only of the same order as bromine in sea-water. Separation and recovery have to be carried out with extreme care owing to the instability of the penicillin, and the material is finally frozen and dried from that state in the same fashion as dried plasma is produced. An immense amount of special equipment has been needed for this purpose. Penicillin as finally supplied to the physician is a yellow or brown powder, containing 100 to 500 units per mg., or about 8 to 30% of sodium penicillin.

All this has needed the erection of more than a score of factories and the expenditure of 20 million dollars. The decision to manufacture the major proportion of supplies of penicillin in the U.S.A. and Canada has largely turned on the demands it has made on labour, factory space, and technical equipment at a time when we were already fully engaged in our war effort. Production is finally expected to reach 200×10^9 units a month, or 9 lb. of pure penicillin a day. A severe case requiring penicillin therapy will need about a million units, for which the present cost is 47.5 dollars—a cost that will certainly fall. It is clear that it will not be long before penicillin is generally available. Some of the unwise publicity that the drug has received may then recoil in disappointment. Penicillin is the best of all antiseptics for serious wounds. It is superior to the sulphonamides in the treatment of venereal disease. For both reasons it is of immense value to the military physician, who has his patients under his complete control. On the other hand, penicillin is not a cure-all and it is not effective by mouth. For general illnesses it must be given by frequent or continuous injection. Adequate treatment of an illness with penicillin is as difficult as the treatment of diabetic coma with insulin. Inadequate treatment will merely waste and discredit a drug which it has taken so much thought and labour to produce.

[1] Elder, A. L., and Monroe, L. A., *Chem. and Metallurg. Engng.*, March, 1944.
[2] Coghill, R. D., *Chem. and Engng. News*, April 25, 1944.

ECONOMY OF DRUGS IN WARTIME

A revised edition of the M.R.C. War Memorandum No. on *Economy in the Use of Drugs in Wartime* has been published by H.M. Stationery Office, price 3d. This memorandum, first printed in March, 1941, expresses the considered opinion of the Therapeutic Requirements Committee set up by the Medical Research Council in consultation with the Ministry of Health. The body of the memorandum takes the form of a list of drugs grouped

according to their therapeutic value and their availability in wartime, the main lines of the original list being followed. Some change, however, has been made in the method of classifying the drugs. As the war has proceeded it has become increasingly difficult to keep separate the ideas that a drug, on the one hand, may be readily available and, on the other, may be essential to the practice of medicine. The shortage of one drug may lead to an unusually large demand for another, which in consequence becomes in short supply. Stocks of drugs of all kinds tend to be smaller in time of war, and changes in the supply position may occur quickly; too rigid grouping may thus defeat its own object. The classification adopted in the new edition is as follows: (A) drugs which are important therapeutic agents and which should be made available so far as practicable; (B) drugs which are needed for certain purposes but of which supplies are limited; (C) drugs which are not essential and do not justify importation or manufacture for home use in wartime. The group "A" now aims at indicating simply those drugs which are eminently of value as therapeutic agents. It is left to the good sense of the prescriber to use drugs in group "B" only for the purposes for which they are known to be of substantial value; he should not prescribe any "B" drug as a placebo. The committee makes it clear that the list is primarily intended to secure the wisest economy in the use of drugs for consumption in this country and that other considerations may affect the importation or manufacture of drugs for the export trade. Responsibility for providing drugs and therapeutic substances is now vested in the Ministry of Supply, which acts in consultation with the Ministry of Health. Both Ministries are represented on the Therapeutic Requirements Committee.

In April, 1942, a memorandum on *Economy in the Use of Bactericides*, prepared by the Therapeutic Requirements Committee, was issued by the M.R.C. and reproduced in our issue of April 11. This document has now been revised and appears as an appendix to the new edition of the main memorandum.

PROGNOSIS IN GASTRIC CANCER

Carcinoma of the stomach claims every day over forty victims in Great Britain alone. Its prophylaxis, early diagnosis, and surgical treatment are consequently problems of the first importance. Carcinoma probably never develops in a healthy stomach, so that the study of the causes, prevention, and treatment of precancerous gastric conditions, such as achlorhydric gastritis, chronic gastric ulcer, and adenomatous polypi, holds out much hope for reducing its incidence in the future.[1] Early diagnosis depends largely on improving the education of the medical student, so that the practitioner of the future will learn that digestive symptoms occurring after the age of 40 which do not promptly disappear with simple treatment call for thorough investigation. Given the opportunity, the biochemist, radiologist, and gastroscopist can diagnose carcinoma in a large majority of cases by the time that the first symptoms have appeared and before any tumour is palpable. Unfortunately, however, the surgeon rarely sees a case in which symptoms have not been present for many weeks or months before the patient has undergone a thorough examination. Even with the delay in diagnosis which is still almost universal the prospects of successful surgery in carcinoma of the stomach are better than is generally believed. This is well seen in surveys recently published on work done in the Mayo Clinic.[2,3] The proportion of patients with cancer of the stomach admitted to the clinic and considered suitable for operation rose from 54% in 1928 to 67% in 1942, and of these the percentage in whom the growth was resected increased from 48 to 58, whilst the operative mortality fell to 6.7% in 1942, the lowest on record in the clinic. The last figure does not leave much room for improvement, but one can still hope that the operability rate will materially increase with earlier diagnosis and by extending the scope of partial gastrectomy. Of over 10,000 patients who survived resection between 1907 and 1938 29% were alive at the end of five years, after which the chance of survival was about the same as for persons of comparable age in the general population. Actually 6.3% had lived for twenty-five years or longer. It is important to remember that complete gastrectomy does not interfere with nutrition and that it does not necessitate any considerable dietetic restriction. The development of microcytic or macrocytic anaemia is also easily prevented.

The operability of cancer of the stomach has shown considerable advances during the last few years owing to the fact that lesions formerly regarded as inoperable on account of their inaccessibility are now being successfully removed. This is true particularly of lesions involving the cardia, which can often be successfully removed by the transpleural approach, the advance being thus perhaps more due to the work of the thoracic than to that of the abdominal surgeon.

[1] Hurst, A. F., *Lancet*, 1938, **1**, 553.
[2] Walters, W., *et al.*, *Proc. Mayo Clin.*, 1943, **18**, 505.
[3] *Arch. Surg.*, 1943, **46**, 939.

WHAT THE PUBLIC KNOWS ABOUT HEALTH

The Ministry of Health determined recently to find out how far its statements about venereal diseases, published in the newspapers and popular magazines, had attracted the attention of the public and what was the state of public knowledge about these diseases. The task was entrusted to a body called the Wartime Social Survey, which is the Government's social research unit and exists to provide any Department with information not available from other sources which may be needed for the shaping of policy or administration. The results were given to the June meeting of the Royal Statistical Society in a paper by two of the investigators—Kathleen Box and Geoffrey Thomas. A sample of people aged between 14 and 50, equally divided between the sexes and from different occupation groups, were chosen by the interviewers, who were told to abandon the interview if the informant seemed reluctant to answer owing to a distaste for the subject or excessive shyness. It is worthy of remark that only 3% of the interviews were abandoned, and that 60% of the people were "very interested, helpful, and willing." Of the sample taken, 86% had seen the Ministry's statements, and 72% said they had read them. Of the men 81% and of the women 62% answered that they knew what venereal diseases were, and of these, 11% of the men and 6% of the women declared that they "knew all about venereal diseases." Of the remainder 17% of the total sample were "not quite sure" or returned a vague answer, and 11% "did not know what these diseases were." It appears that rather more than a quarter of the people interviewed, whether or not they knew anything about venereal diseases before they saw the Ministry's statements, had learned something from those publications. The results suggest—and it will not surprise anyone even to-day—that the group most in need of education is the under-20 group, and that men in the later age groups and in the higher income groups are, on the whole, the best informed.

A further inquiry was undertaken to discover how much parents knew about the causes, dangers, and methods of

prevention of diphtheria. A sample of parents with children under 14 years was interviewed, and the inquiry covered two types of districts—those in which there was a high rate of immunization and those in which there was a low. Asked "What do you know about the cause of diphtheria?" 51% of the parents simply did not know, 24% declared it to be poor health, bad sanitation, or dirt, and 25% thought it due to contagious illness or germs. The extent of knowledge was greatest in the upper economic group. The percentage of parents in good immunization areas who did not know the cause of diphtheria was 27, and in the bad areas 56. But three-quarters of the parents knew what the dangers of diphtheria were, and 60% in all the groups believed in immunization as a preventive.

The Wartime Social Survey is now engaged in experimentation on a method of obtaining month-to-month statistics relating to the incidence of illness in the whole population between the ages of 16 and 64. It is hoped that if this method is successful it will be possible to keep a constant check on the health of the people. The figures will permit of analysis into age groups, occupations, and certain environmental factors. The organization is also spreading itself into other fields, such as the cooking habits of the people, the meals eaten by people doing different sorts of work, public attitudes towards food rationing and shortages, clothing needs in selected occupation groups, the response to the "coughs and sneezes" posters, domestic heating and lighting problems, and, in Scotland more particularly, housing questions. Such methods are no doubt very useful provided their limitations are understood and they are not regarded as a kind of magic. In eliciting opinion as compared with facts they may prove very deceptive.

TRACING A CARRIER THROUGH SEWAGE

A new example of what can be done by modern bacteriological detective methods is described in a recent paper by G. J. G. King.[1] An essential proceeding in this investigation was the phage typing of paratyphoid bacilli, which was described by Felix in this *Journal* last year.[2] The definition of separate types of *Bact. typhosum* by their susceptibility to different strains of bacteriophage, originally developed by Cragie and Yen, has been practised extensively in this country by Felix and now extended to *Bact. paratyphosum* B. This method, to which there is no alternative among the enteric group of organisms, enables type distinctions to be made which serve the same purpose as, for example, serological typing among haemolytic streptococci. It can thus be decided at least that a particular case or carrier is unconnected with a prevailing epidemic if the type of his organism is different from that prevalent in the district. The story told by King concerns paratyphoid fever in Glamorgan, where an outbreak due to Type 1 occurred in 1941. During this epidemic a single strain not then identifiable as belonging to any recognized type was isolated from a case in another part of the county. In March, 1943, the sewage effluents from a factory were examined for a purpose unconnected with the earlier outbreak, and by the use of desoxycholate citrate broth *Bact. paratyphosum* B was isolated and found to belong to the newly recognized Type 3A. The evident existence of a carrier among the employees of this factory demanded the examination of individual samples of faeces, and this led to the identification of the source of the organism found in the sewage. This proved to be the man who had had the disease in 1941 and whose strain differed from that in the prevailing epidemic. Re-examination of the culture obtained from him two years previously and not then identified showed it to be of Type 3A. This episode gives some idea of what can now be done both by the use of highly selective culture media and by phage typing in studying the epidemiology of enteric fever. It is the first occasion on which the existence of a carrier has been detected by finding his organism in sewage.

[1] *E.P.H.L.S. Bull.*, 1944, **4**, 81.
[2] *British Medical Journal*, 1943, **1**, 127.

IS NITROUS OXIDE "SAFE"?

Academic discussions about the "safety" of any particular anaesthetic agent, or the pathological effect it produces on the various organs of the body, are meaningless without any reference to the fact that during the administration the patient should receive an adequate supply of oxygen. Complete oxygen lack means death in a few minutes, but even partial oxygen lack, if prolonged, may result in irreparable damage to nervous tissue. In extreme cases of oxygen deprivation death has resulted after a period of unconsciousness and convulsions. In others varying degrees of mental impairment have become evident. Anoxia is an inseparable partner of nitrous oxide, an agent that has been lauded for many years as "harmless" and "non-toxic." Informed opinion is still not agreed about the precise mechanism whereby this gas produces anaesthesia; but no one doubts that deprivation of oxygen inevitably accompanies anaesthesia from nitrous oxide. It is in addition a "weak" anaesthetic, and muscular relaxation is difficult to attain with it. Therein lies the pitfall for the unwary. A desire to benefit the patient by "pushing" this gas by cutting down the oxygen instead of reinforcing it with a more powerful agent may have unfortunate results, as Courville[1] in America—and occasionally the coroners' courts in this country—has shown. Nitrous oxide and oxygen has a wide sphere of usefulness, and when given by an expert is a safe anaesthetic and is followed by a minimum of after-effects. Nevertheless the fact that nitrous oxide is harmless when used to produce a minute or so of semi-asphyxial unconsciousness in the dentist's chair should not lead the inexperienced to suppose that it is equally harmless when used by them in abdominal surgery. It is true that after adequate morphinization good results are obtained by the few experts in the use of this gas. A special and potentially dangerous technique is followed. This in inexperienced hands is fraught with disappointment if not carried out boldly, and with danger if it is. It is also true that during abdominal operations surgeons are sometimes deliberately led to believe that only nitrous oxide is being used when in fact the gas is surreptitiously diverted over one of the more potent liquid anaesthetics. Nitrous oxide here could well be replaced by compressed air, or, alternatively, equally satisfactory results would follow the old-fashioned method of pouring the liquid anaesthetic on an open mask. The teaching that nitrous oxide is "harmless," "non-toxic," and "the least dangerous anaesthetic" should always be qualified, and the limitations and indications of this anaesthetic carefully defined. Statements about its harmlessness should not be made by physicians unfamiliar with the requirements of modern surgical technique. "A whiff of gas" may be dangerous if taken literally, and the phrase "fit for gas" when it is meant to imply "unfit for anything else" should disappear from the case notes of ill patients requiring extensive operation.

[1] Courville, C. B., *Untoward Effects of Nitrous Oxide Anaesthesia*, 1939, Mount View, California.

Reports of Societies

TREATMENT WITH PENICILLIN

At a meeting of the Fever Group of the Society of Medical Officers of Health, with Dr. ANDREW TOPPING in the chair, a discussion on penicillin was opened by Sir ALEXANDER FLEMING, who demonstrated graphically blood levels and rate of disappearance of penicillin after adminstration by various routes. He also described the slide cell and the capillary culture methods of estimating penicillin content of the blood by bacteriostatic tests.

Ten Civilian Cases

Dr. A. DOLPHIN (L.C.C.) gave an account of 10 cases treated at the North-Western Hospital, L.C.C.: 6 cases of puerperal septicaemia, of which 3 were due to anaerobic streptococci, 2 to *Staphylococcus aureus*, and one to *Strep. haemolyticus*; 3 cases of suppurative meningitis, of which one was caused by the *Strep. haemolyticus*, the others by pneumococci. The tenth case was an infective endocarditis due to *Strep. viridans*. In each instance the causative organism was isolated and proved to be penicillin-sensitive.

In all three anaerobic streptococcal septicaemias there were lung complications on admission; after two days' treatment with penicillin blood cultures became negative, accompanied by decided clinical improvement. The improvement was not maintained, though the blood remained sterile, and two of the patients died from multiple lung abscesses, the third from intestinal obstruction due to multiple peritoneal adhesions. This patient gave a strongly positive blood and cerebrospinal fluid Wassermann reaction before penicillin administration; thereafter the blood W.R. became practically negative but the C.S.F. W.R. remained strongly positive. At no time was the drug detected in the C.S.F.

The first patient with *Staph. aureus* septicaemia had mitral stenosis, haematuria, and skin petechiae. The blood became sterile after two days' penicillin treatment. Death occurred 11 days later from uraemia, confirmed at necropsy by the presence of chronic nephritis lesions. The other patient was treated on the 9th day of disease, and after a first course of 790,000 units she relapsed and two further courses were necessary before recovery.

The patient with *Strep. haemolyticus* septicaemia was treated on the 12th day of disease. She recovered, but was left with permanent valvular heart damage, probably well advanced before treatment.

The haemolytic streptococcus meningitis case—an infant of 5 months—received treatment on the 8th day of disease. The drug was given intrathecally, intramuscularly, and (after bilateral mastoidectomy) into the mastoid wounds. The C.S.F. became sterile, but subarachnoid block developed and signs of local cerebral irritation. The mastoid wounds were reopened and the brain unsuccessfully needled for pus.

Of the two cases of pneumococcal meningitis one had severe septicaemia on the 29th day of disease and subarachnoid block when admitted for treatment. Penicillin was injected into the cerebral ventricles, cisterna magna, spinal theca, and intramuscularly. The blood became sterile, but the meningitis did not respond and the patient died on the third day of treatment. Necropsy was refused. The second pneumococcal meningitis case likewise did not respond to penicillin owing to subarachnoid block, confirmed at necropsy.

Treatment of the *Strep. viridans* septicaemia was started on the 4th day of disease, when the patient appeared to be dying. After 24 hours on penicillin the blood was sterile, the temperature normal, and the general condition considerably improved. Subsequent blood cultures were sterile, and the patient had not relapsed.

All the septicaemias except the last case were treated by intermittent intramuscular injections of 15,000 units of penicillin, with intravenous injections initially in a few cases. The injections were given 3-hourly at first, and therapy was stopped gradually either by lengthening the intervals between injections or reducing each dose. The last case was treated by continuous intravenous drip, 100,000 units in 24 hours; treatment lasted 13 days and was stopped suddenly. A constant blood bacteriostasis was maintained, but the method had the serious disadvantage that thrombophlebitis was a common occurrence and all the available veins might be used during a prolonged course of treatment.

Dr. Dolphin added that a falling pulse rate was a more reliable guide to successful therapy than the temperature, because fever often increased when penicillin was first given. The earliest signs of success were better appetite and sleep and relief of pain and malaise. Occasionally the blood urea rose during therapy, and a falling white cell count, if originally high, or a rising count, if originally low, because of previous administration of sulphonamide, were favourable signs.

Discussion

Dr. W. GUNN (L.C.C.) suggested that the results appeared worse than the clinical facts indicated; all three anaerobic streptococcal cases were very toxic and obviously bad risks, and two of the three meningitis patients were moribund on admission. It was probable that a more generous dosage, preferably using a continuous method, would have yielded better results. Intermittent administration with consequent intermittent bacteriostasis and gradual withdrawal of the drug might conceivably induce drug resistance, as Schmidt and Scaler[1] showed experimentally with pneumococci in mice. The last case described—a bad risk—was treated by the intravenous route followed by sudden withdrawal with conspicuous success, as was a more recent case of staphylococcal septicaemia after mastoidectomy not included in this series. Only, extreme scarcity of the drug could justify inadequate dosage, which, as seen in the fifth case requiring three courses of treatment, was liable to prove uneconomical in the long run.

Dr. J. M. ALSTON (L.C.C.) described the case of an elderly man with an anaerobic streptococcal septicaemia who responded repeatedly though temporarily to intravenous injections of a crude preparation of penicillin. He was struck by the marked and immediate clearing of the mental condition in desperately ill patients after quite small doses. In animal experiments he had found *Leptospira icterohaemorrhagiae* sensitive to penicillin, but treatment of affected guinea-pigs had to be undertaken early and with big dosage.

Dr. ROBERT CRUICKSHANK (L.C.C.) stressed the value of *quantitative* blood culture in the prognosis of generalized infections. For example, in staphylococcal infections an increase in the bacterial count from 20 to over 100 organisms per c.cm. of blood within 24 hours meant a grave prognosis. Staphylococcal septicaemia was often complicated by renal damage, which resulted in a reduced excretion of penicillin, so that the drug could still be demonstrated in the blood 6 to 12 hours after the standard intramuscular dose of 15,000 units. The outstanding feature at necropsy in the patients with anaerobic streptococcus septicaemia was the multiple lung abscesses secondary to the primary septic thrombophlebitis in the pelvic veins. If these infections could be diagnosed and treated early, he was sure that penicillin therapy would be effective.

PENICILLIN FOR CIVILIANS

The following brief memorandum on the selection of cases for treatment with penicillin under the arrangements for civilians noted in these columns on Aug. 19 (p. 250) has been issued by the Ministry of Health.

The list of diseases for which penicillin may be used is as follows:

"1. Conditions which should be admitted to hospital if the case is otherwise suitable for treatment with penicillin:

Staphylococcal Infections.—Septicaemia. Early acute osteomyelitis. Severe carbuncle, cavernous sinus thrombosis, or any other life-endangering infection.

Haemolytic Streptococcal, Pneumococcal, and Meningococcal Infections.—Any life-endangering infection (septicaemia, pneumonia, meningitis) which has failed to respond to adequate sulphonamide treatment.

Gas Gangrene.

2. Conditions deserving special consideration, which may be treated if supplies are sufficient: (*a*) Injuries of the eye and infections of the conjunctiva and cornea. (*b*) Sepsis in wounds and burns. (*c*) Infections of the skin resistant to other forms of treatment (sycosis, impetigo, etc.) (*d*) Sulphonamide-resistant gonorrhoea. (*e*) Acute empyema and pyogenic infections of the pleura as a complication of tuberculosis. (*f*) Traumatic lesions, including compound fractures of any bone, extensive muscle injuries, facial injuries, injuries necessitating suture of tendon or nerve, thoracic injuries (haemothorax), and post-traumatic pneumonias.

If supplies are sufficient, approved departments and hospitals specializing in ophthalmology, neurosurgery, thoracic surgery, burns, etc., may be given a supply of penicillin.

3. Conditions which will *not* be treated are those caused by organisms not known to be susceptible to penicillin (including rheumatic fever, ulcerative colitis, and all other intestinal infections). Bacterial endocarditis and syphilis will also be excluded.

[1] Schmidt, L. H., and Scaler, L., *Proc. Soc. exp. Biol. Med.*, 1943 **4**, 353.

ACADEMY OF MEDICAL SCIENCES OF THE U.S.S.R.

The announcement just received of the formation of an Academy of Medical Sciences of the U.S.S.R. indicates a recognition in that country of the need to reverse the trend towards narrow specialization which has characterized scientific progress (including medicine) in recent years. The academy, whose members to start with will number 56, is to be set up under the People's Commissariat of Health, and will have three departments: (1) medical biology; (2) hygiene, microbiology, and epidemiology; and (3) clinical medicine. Each of these will be composed of several scientific institutes, 25 in all, many of which will be, in effect, an extension of the appropriate section of the All-Union Institute of Experimental Medicine which is being merged with the academy. An organizing bureau has been set up under the chairmanship of the People's Commissar for Health of the U.S.S.R., and among the first members are N. N. Burdenko, A. I. Abrikosov, N. I. Grashchenkov, B. D. Petrov, and S. G. Suvorov. Commenting in *Izvestia* recently on the tendency to work in isolation in the medical field, Abrikosov said there had been no exchange of experience and achievement between medical men, no mutual help, and no co-ordination of work. In addition, there had been mistakes in the direction of scientific investigation. Biology, histology, physiology, pathological morphology, and general pathology and pharmacology (including chemotherapy), which would be the field of activity of the department of medical biology, were of the first importance to an understanding of the nature of disease and the discovery of new methods of diagnosis and treatment. They were the foundation of medicine itself; without more knowledge of the structure of chemistry and normal functions of the human organism further advance in medical science would be impossible. It was hoped that the new academy would not only benefit medicine in the U.S.S.R. but would attain a position of repute in the estimation of medical men the world over.

BIRMINGHAM ACCIDENT HOSPITAL

The new reception and out-patient departments at the Birmingham Accident Hospital were opened on Aug. 14 by the Minister of Health. The Lord Mayor of Birmingham as president of the hospital was in the chair. Declaring the new block open, Mr. Willink said he appreciated being able to lay aside wartime duties for a day to see something that was of a constructive nature with important implications for the future. In spite of much difficulty Birmingham had, in the middle of a war, gone ahead with an experiment on accident treatment that was being closely studied by other communities. His advisers at the Ministry felt that this type of hospital would have a permanent place in the future hospital services. Three qualities of the hospital impressed him. First, imagination had been used to transform an old building so effectively, and to link it with close ties to industry; he liked the idea of special rehabilitation workships; secondly, the full development of modern resources and medical skill; even the waiting hall was a bright and cheery place; and, thirdly, this was an example of citizenship and of co-operation—a spirit which he had hoped would pervade the new national health service. He saw here close collaboration between the city authorities, the university, and the hospital. It was clear that the people as a whole, and especially those in industry, were taking a deep and personal interest in the development of new and specialized methods of accident treatment.

Mr. George Tomlinson, Parliamentary Secretary to the Minister of Labour, who was also there, said that the success of modern hospital practice was largely due to the application of sound common sense in the treatment of humanity. Many big words, sometimes frightening ones, were used to describe the work of the medical profession: occupational therapy, for instance, was no more or less than curing by work. Rehabilitation, in the real sense of the term, must include a full sense of security. A scheme which did not recognize its economic implications could not be successful. Before the war 200,000 persons were unemployable through disablement. Because of the urgency of national effort all but 18,000 of them had taken up work in some form or other. Rehabilitation was one of the great social advances which had emerged from this war.

L. Dungal (*J. Amer. med Ass.*, 1944, **125**, 20), during an epidemic of measles in Iceland in 1942, injected 302 persons with convalescent serum. 139 (70%) remained free of symptoms and most of the rest got the disease in a much milder form than the unprotected. The dosage was 1 c.cm. of serum for each year of age, but never less than 2 c.cm. and up to 20 c.cm. for adults.

Nova et Vetera

THE DOCTOR'S OATH

No document in all medical literature is quoted so often as the so-called Hippocratic Oath. Books and articles on it mount to a veritable library. There are many and divergent opinions on its origin, meaning, and application. Perhaps no part of it has been so debated as its ethical rules. To these have been ascribed a timeless validity. Critical reflection may raise a doubt. "With purity and holiness I will pass my life," for example, presupposes recognized standards of these qualities. But neither the purity nor the holiness of a small Greek sect or guild in the fifth century B.C. meant at all the same as they mean in our Western civilization two and a half millennia later. Attention is often directed also to the prohibition of abortion. This was, in fact, practised freely in Greek times. Why not in a world in which it was considered justifiable to expose infants? Moreover, there are open references to abortion in books of the Hippocratic Collection. With many such points in mind scholars have divided up the Oath, distributing its parts to various dates between the sixth century B.C. and the third A.D.

Dr. L. Edelstein of the Institute for the History of Medicine at Johns Hopkins appropriately opens a new series of publications from that institution with a searching and original review of the whole problem.[1] He reaches the conclusion that the Oath is, in all essentials, a single document. He regards it as uniformly conceived and saturated throughout with Pythagorean philosophy, which should, perhaps, be called the Pythagorean religion. In spirit and letter, in form and content, it is a Pythagorean manifesto. Dr. Edelstein believes it to be intelligible only as such. He holds that the Oath was outlined towards the end of the fourth century B.C. He gives good reason for believing it to be post-Aristotelian, and about a century later than Hippocrates of Cos. Apart from evidence as to its nature, we know that it would have been timely in the later fourth century, when many attempts were made to improve medical conditions, while at the same time Pythagorean ethics were being elaborated and formulated. Specifically it is often noted that the Oath is *not* a legal enactment. It is rather a solemn promise, guaranteed only by the conscience. This is in full keeping with the ethics of the Pythagoreans. They insisted that all instruction must be based on willingness of pupil and teacher, on voluntary rule as well as on voluntary obedience. As Plato saw it, the Pythagorean "way of life" meant no political or group movement; Pythagoras wished to stir the conscience of the individual, and this desire appears vividly in the Oath. If Dr. Edelstein is right or substantially right—and we believe that he has made a very strong case—most of the difficulties and contradictions of this venerable and venerated document fade happily away.

CLIMACTERIC YEARS

It would be amusing to make a list of authors whose names we all know but whose works we have never read. Richardson would be high in the list and Edmund Spenser not very low down; still, curiosity has tempted people not sitting for examinations to try *Clarissa Harlowe*, and a good many have begun the *Faerie Queene*. A name to put very high up is Salmasius. More school-boys than those of Macaulay remember that John Milton had a controversy with Salmasius (Claude de Saumaise), and some of us recollect Dr. Johnson's remark: "As Salmasius reproached Milton with losing his eyes in the quarrel, Milton delighted himself with the belief that he had shortened Salmasius's life, and both perhaps with more malignity than reason."

The year before Salmasius wrote his defence of Charles I he published a dissertation on climacteric years, which, it is safe to say, not even Macaulay's school-boy has read. I possess a copy which once belonged to Sir George Buchanan, F.R.S., given to me by his son the late Sir George Seaton Buchanan. "Climacteric" has still a faintly medical aroma.

[1] *Supplements to the Bulletin of the History of Medicine.* Editor, Henry E. Sigerist. No. 1. *The Hippocratic Oath.* Text, Translation, and Interpretation by Ludwig Edelstein. Baltimore: The Johns Hopkins Press. 1943. ($1.25; to subscribers to the *Bulletin of the History of Medicine*, $1.00.)

I think it is now old-fashioned to use the word as a synonym of the menopause, and hardly anybody calls the sixty-third year of life the grand climacteric. I cannot honestly say that I have read every one of the 850 pages of this book: although it *has* some medical interest it is not primarily a medical book. Indeed, Salmasius is quite clear that the subject of climacterics belongs not to medicine but astrology, and most of the first seven hundred pages are concerned with astrology—viz., what Greek and Roman writers said, and how climacteric years were computed.

Most of us know just as much of the technique of astrology as we can learn from *Guy Mannering*, and I cannot recommend Salmasius as a guide to its mysteries. He was no doubt an extremely learned man, but his arithmetic is weak and his illustrations of working rules inconsistent one with another. Possibly he did not check his arithmetic because the further he went with his studies the stronger became a conviction (expressed, the reader will recall, by Dominie Sampson) that judicial astrology was pure nonsense. Possibly the problem of twins first excited a doubt—he comments on the different fates of Jacob and Esau, who, however, were not identical twins—but, anyhow, his last hundred pages vigorously assail the whole doctrine and do have a medical flavour. He returns more than once to the problem of alcoholism. It is indeed rather hard to see how the importation of wine into what was once a water-drinking country could be allowed for in judicial astronomy. He wants to know what the stars could do about new diseases, and discusses smallpox (that part of his book was annotated by Sir George Buchanan). He also is sarcastic (writing in Latin gave him an advantage in times when sexual perversions were not topics of polite conversation) on the influence of the stars on the variations of homosexuality in different places or in the same place at different times. Indeed, his onslaught on stellar influences is so vigorous that one might think it odd he should give so much attention to what was essentially, in his opinion, so silly. That, however, would be unjust. Salmasius, like his great predecessor Scaliger, wished to know what the Greek and Roman writers had said and believed—whether rightly or wrongly—on all subjects which seemed to them important, and, coming after Scaliger and being intellectually a much smaller man, his harvest of valuable information was inferior.

Johnson said of the controversy between Milton and Salmasius: "No man forgets his original trade: the rights of nations, and of kings, sink into questions of grammar, if grammarians discuss them." Salmasius was certainly more interested in grammar—in Johnson's sense—than in the question whether there were any basis in fact not for judicial astrology but for belief in climacterics.

Sir Humphry Rolleston in his Linacre Lecture (*Some Medical Aspects of Old Age*, London, 1922) concluded that: "The conception of the climacteric disease is interesting historically only; and it may be agreed that apart from accidents of environment the progress of senescence in healthy men is gradual and uneventful." One must, however, note that the old doctrine did not imply a sudden deterioration, but a change, whether for better or worse. Some men go downhill rapidly after retirement; others seem to have taken a new lease of life. Without a large collection of minutely and accurately recorded diaries kept by men from, say, the age of 60 to death, we could hardly test the hypothesis. No doubt a diligent student could assemble a goodly number of diaries fulfilling the condition; but the statistician would object that diarists are not a random sample of mankind, so the grand climacteric is likely to remain of antiquarian interest only. M. G.

HISTORY OF COMPARATIVE ANATOMY

Prof. F. J. Cole of University College, Reading, has furnished zoologists and anatomists of to-day with a delightful retrospect of the older naturalists from the times of Aristotle, Galen, and Pliny to the beginning of the eighteenth century. The interest of readers of this work, *A History of Comparative Anatomy*,[1] is maintained throughout by the variety of aspects from which the subject has been viewed, and by the manner in which the author has considered the character and work of each individual in accordance with the period in which he lived—e.g., before the old prejudice against the dissection of the human body had been overcome, and "zootomists" were compelled to limit themselves to dissection of apes, dogs, and pigs in order to gain an insight into the anatomy of the human subject; or, at a later period, before the use of the compound microscope and the various methods of injection of vessels and other cavities had been evolved, or before the employment of preservatives such as turpentine or alcohol in the form of brandy or rum. Prof. Cole also clearly distinguishes the different lines of approach which inspired the work of the early naturalists. Thus human anatomists, from the sixteenth century onwards, have, in order to understand more fully the mechanism of the body, tended to study the structure of the various organs and systems in relation to their function. Among these may be mentioned Harvey, John Hunter, Malpighi, Perrault, Stem, Swammerdam, and Tyson, who established the physiomorphological aspect of comparative anatomy; whereas others, apparently inspired by simple curiosity, collected and dissected any material which came to hand, without system or definite object, as contrasted with the study from a medical or utilitarian standpoint, such as that which activated the researches of Pasteur and others at a later date. As an example of the collector type of naturalist, F. Ruysch of Amsterdam may be cited, an illustration of whose work is shown in Fig. 199: a pictorial museum exhibit composed of various emblematical representations, grouped in a "grotesque arboreal" fashion on an hexagonal wooden stand—e.g., "a skeleton *in extremis*, grasping the emblem of insect mortality, the may-fly."

The book is well illustrated and the reproductions of many of the original figures show the great exactitude and artistic capacity of some of the early naturalists, or their draughtsmen as evidenced by the drawings of Leonardo da Vinci, Swammerdam, Leeuwenhoek, and others. The figures as a whole are most instructive, and would have been even more so if the lettering and numbers had been more fully explained either in the legends or in the text. The work concludes with an appendix consisting of biographical notes and a bibliography. It represents a valuable and critical survey of the history of adult comparative anatomy, which will be a welcome addition to the libraries of all who are interested in the progress of biological science.

[1] *A History of Comparative Anatomy from Aristotle to the Eighteenth Century*. By F. J. Cole. (Pp. 524; illustrated. 30s.) London: Macmillan and Co. 1944.

Correspondence

Military Psychiatry

SIR,—The letter of Dr. B. H. Shaw on military psychiatry (*B.M.J.*, Aug. 12, p. 222) points out apparent contradictions in the article by Lieut.-Col. H. B. Craigie entitled "Two Years Military Psychiatry in the Middle East" (July 22, p. 105).

Dr. Shaw directs attention to the high proportion of psychotic and neurotic casualties returned to duty with the Middle East Force, and contrasts these figures with Lieut.-Col. Craigie's statement that such men's "presence constitutes a continued if only potential menace to the morale of the group as a whole." As Consultant in Psychological Medicine to the Director of Medical Services of the Middle East Force during the whole of the period in which fighting took place against the Italians and Germans in the huge area known as the Middle East, I venture to submit a few words of explanation and amplification of Lieut.-Col. Craigie's remarks.

Evacuation from the Middle East was always a difficult problem even if it was desirable for most cases of neurosis. Man-power was a serious matter also, and use was made of every available soldier. The policy of the Psychiatric Services therefore was always directed to treatment and rehabilitation by all possible means, followed by a careful estimation of the potentialities of each invalid on recovery. The result was that a great many such recovered men were regraded in medical category and were replaced somewhere in the military machine. It may well be that Dr. Shaw has pictured these recoveries returning to combat duties with fighting units. This was not

necessarily the case. A large potentiality exists in a fighting force for duties other than combatant which can be carried out adequately by men recovered from mental illness, especially if time is allowed for a brief period of training. Under an adequate system of personnel selection many of these men would never have been admitted to any fighting Service—but there they were. There was no way home, and so they were put to work, in some useful way, on lines of communication, in ports, or in the great workshops and depots of the Middle East.

Dr. Shaw refers to schizophrenia as "a particularly intractable and dangerous disease." Agreed. But it was a common experience of most psychiatrists in the Middle East, as well as other fighting fronts, to encounter a mental state, sometimes the result of battle experience, which was indistinguishable from an acute schizophrenic illness in symptomatology, but which showed an almost universal tendency to recovery with or without special means of treatment. Such men were usually diagnosed "schizophrenia," though it may well be that "hysteria" might have been more correct. These brief "schizoid" breakdowns are of great interest to the clinician and require discussion, but not, Sir, in this letter.—I am, etc.,

G. W. B. JAMES,
Brigadier; Consulting Psychiatrist to the Army at Home; late Consulant to the Middle East Force.

Registration of Specialists

SIR,—Your report on this subject (Aug. 5, p. 188) suggests that there is an urgency for a further report. I trust in this full attention will be paid to the position of men and women in the Services: not those who had established specialist status before the war, for their position is, or ought to be, secure, but those who, but for the war, would by this time have acquired specialist status.

The position did not arise so prominently after the last war, for the home hospitals were largely staffed by old practitioners who patriotically came back into service as house-physicians, surgeons, etc.—posts for which their wide experience particularly fitted them. The surgery and other specialist work was done by competent visiting staff from the neighbourhood, who all appeared prepared to give every moment they were required for this work. So far as my observations in surgery during over 4 years in a war hospital go, the visiting surgeons considered that every wound was worthy of their personal skill and attention.

In this war certain house officers have been retained 2, 3, 4, or even 5 years. They have acquired knowledge and experience in specialist work under exceptional circumstances; they have perhaps been able to take the higher qualifications. Some have been able eventually to join the Services with specialist rank and duties; the others by their long experience have fitted themselves for appointments on the staffs of hospitals. Because these posts have been held so long by the same individuals, not always of their own free will, their fellow students were perhaps unable to get a resident post at all, or only for a brief period: many felt that it was their duty to join the Services at the earliest possible moment, whatever the cost to their career. In that case they were generally put out of touch with teaching and other essential experience which would permit them to take the higher qualification; they acquired merely the rank due to service, and this with a severance from their families and friends at perhaps no little additional risk.

Notwithstanding this, new appointments are being made on hospital staffs, and with the possibility of early cessation of hostilities will come the urge to fill other vacancies which have occurred during the war and to create other specialist posts. The men who have acquired their knowledge, experience, and higher qualifications at home during the war will have made important contacts, and there are enough of them to fill all such posts, which will be beyond the fair competition of the men who joined the Services early in their careers.

Unless, therefore, our consultants of the future are to be men who did not serve in the Navy, Army, or Air Force, some period should elapse after the war before any appointments are made, which would permit those serving to acquire the necessary experience and qualifications to compete. They might reasonably be permitted early release from the Services by the recruitment for an equal period of the men who have not had that honour.—I am, etc.,

Birmingham. JAMES F. BRAILSFORD.

SIR,—In the White Paper (p. 54) and under "Registration of Specialists" (*Journal*, Aug. 5, p. 188) there seems to be some confusion of thought; the words "specialist" and "consultant" seem interchangeable. This should not matter were it not for the unfortunate suggestion that this class of "super-doctor" is not to engage in general practice. In the country some of the most valuable work done is team work between doctors who are often on the staff of voluntary hospitals and their colleagues in general practice. These consultations utilize the knowledge of men who have given special study to certain branches of medicine and surgery, and are most valuable to the general public. But there is not enough work in consultation and special treatment to make a living in most country towns and districts. These men are therefore also in general practice. They are all the more valuable as they are in constant contact with the health of their district and with the general trend of medical advances.

To create a separate class of specialist, who is excluded from general practice, may be wise in the case of certain ophthalmic surgeons, pathologists, *x*-ray experts, etc., but even so their work will be all the better for general clinical experience. But cannot the most valued experienced men be allowed to continue in general practice, and be appointed to act as local consultants, and be paid on the basis of work done? Hospital medical committees are available for the supply of suitable opinions.—I am, etc., H. M. RAVEN.

Metric System in British Medicine

SIR,—With dramatic changes impending in our medical world, both undergraduate and postgraduate, the time is opportune for the adoption of the metric system in medicine. Can we not as a profession lead the way in this respect, so that in time it would become national? The arguments in favour of such a course are so strong that I will not waste space in your columns. Suffice it to say that I, working in a foreign country, have had some initial difficulties that were quickly overcome. But unhappily that is not the case with the foreign visitor to Britain or the foreign reader of our journals, who has the laborious experience of trying to adapt himself to our complicated weights and measures.

It is encouraging to see that a few journals and also some of your contributors are using the decimal method. On the other hand, how many pre-clinical and clinical teachers use it? Must we as a nation remain isolationist in this respect? Can we still subscribe to the argument that other nations must learn our imperial measures? I believe that nothing but good would come from a unified international code in medicine.—I am, etc.,

Istanbul University. W. C. W. NIXON.

Gonorrhoea in East Africa and Ceylon

SIR,—With reference to Lieut.-Col. D. J. Campbell's article (July 8, p. 44) concerning gonorrhoea in North Africa and the Central Mediterranean, I would like to add a few remarks.

Gonorrhoea is prevalent among the African tribes of East Africa, and particularly under Service conditions. Owing to the expense and difficulties of obtaining sulphapyridine or other sulphonamide derivatives the routine treatment recommended in the East African Command was T.A.B. intravenous therapy, with small doses of sulphapyridine intramuscularly, only one tablet of the latter to be used daily. In my experience the sulphapyridine was unnecessary, as equally good results were obtainable by the pyrexial therapy alone. Most of the cases were clear of discharge after seven days. Approximately twelve new cases of gonorrhoea were treated under my care each week for a period of fourteen months, and no deaths or untoward events occurred in any case. I must thank my partner, Capt. M. C. Hodgson, R.A.M.C., without whose assistance this work would not have been possible.

In Ceylon more recently I have treated a number of cases of gonorrhoea among East African troops. A routine (four-day) treatment was adopted using sulphapyridine. This was recommended by the Ceylon Command. The drug

was given in decreasing doses of 6 g., 5 g., 4 g., and 4 g. respectively for four days, making a total of 19 g. Results were very unsatisfactory, and figures corresponded to those of Lieut.-Col. Campbell; approximately 25% responded, and a number of these relapsed. The cases which did not respond were very resistant to treatment.

A number of cases were treated with higher concentrations of the drug, and 25 g. were given. Again many cases were resistant to treatment, and gonococci were still seen after the course. I regret that no comparison was kept using the T.A.B. pyrexial therapy.

It would appear that the "tablet treatment" for gonorrhoea is not all that has been expected of it. Institutional pyrexial therapy proved very successful in East Africa. A point worthy of consideration is that different strains of gonococci may occur in Ceylon which are more virulent to the urethra of a large male population suddenly transplanted some thousands of miles from their own environment.—I am, etc.,

SIDNEY SHAW,
Capt., R.A.M.C.

Sulphonamide-resistant Gonococci

SIR,—I have read with interest Lieut.-Col. D. J. Campbell's article on gonorrhoea in North Africa and the Central Mediterranean (July 8, p. 44). I met with similar conditions when I was in charge of the Merchant Seamen's Venereal Disease Clinic in Freetown throughout 1942 and during the first nine months of 1943. The majority of the infections had been obtained in ports on the east coast of South America and the west coast of Africa. Before their arrival in Freetown many of the patients had been treated with varying doses of, usually, sulphapyridine by the ships' officers of ships carrying no surgeon. The majority of the courses of treatment were inadequate in dosage and extended over too long a period. However, there was no doubt that the gonococci were resistant to sulphapyridine and sulphathiazole. Arthritic complications were uncommon, iritis I never saw, and epididymitis was not uncommon. A profuse urethritis and a prostatitis were present in almost every patient. My opinion, which was shared by others, was that a sulphonamide-resistant strain of gonococcus was being rapidly spread by war conditions. The reasons for the strain being resistant to the sulphonamides were not clear, but possibly it was partly due to the abuse of this class of drug.—I am, etc.,

ATHOL J. JOHNSON,
Makeni. Medical Officer, Sierra Leone, Colonial Medical Service.

Aetiology of Mandibular Osteomyelitis

SIR,—Mr. Rainsford Mowlem in his excellent article (April 15, p. 517) discusses the role of vascular supply in the aetiology of osteomyelitis of the mandible. Mr. Mowlem is referred to two articles on the subject: (1) Miltner and Wolfe, J. J., *Surgery, Gynecology and Obstetrics*, Aug., 1935; (2) Wolfe, J. J., *Chinese Medical Journal*, July, 1936. These articles were based on a large series of cases seen at the Peking Union Medical College and upon experimental work done at the same institution.

The disease arose from infection about an impacted third molar, unusually common among these people. It arose "spontaneously"—that is, none had had extraction of the tooth at the time of admission to hospital. The signs on admission were, besides swelling of the tissue and fever, (1) loosening of the teeth *as far as and including the first premolars*; (2) hypoaesthesia of the lip. This latter sign was found long before bony changes were demonstrable by *x* rays, and could have been caused only by pressure in the mandibular canal.

At operation involvement of bone was seen to extend as far as the mental foramen, the site at which anastomosis with the mandibular artery occurs. Usually the external plate only was involved, but when pus had burrowed under the periosteum of the internal plate this latter also was involved. Operation consisted in removal of the entire outer cortex, removal of the involved teeth, suturing of the gum margins, and packing the wound wide open. Interdental splinting of the jaws was done as a precautionary measure.

Experiments on dogs were divided into two series. In one the external periosteum was stripped from the bone and a cotton saturated culture of mixed staphylococcus, *Streptococcus haemolytica* and *viridans* was packed between the periosteum and the bone. None of these animals developed osteomyelitis. In the second group the pulp chamber of the last molar tooth was opened widely. Through the root canal, which in dogs communicates freely with the mandibular canal, a pledget of cotton saturated with a similar culture of organisms as above noted was packed well down into the mandibular canal. Most of these animals developed osteomyelitis with bone involvement similar in every way to the disease in man. Thrombosis of the mandibular vessels was always present in these animals.

It was concluded that invasion of the mandibular canal and thrombosis of the mandibular vessels were the essential factor in the pathogenesis of mandibular osteomyelitis. The use of penicillin post-operatively as described by Mr. Mowlem is a valuable addition to the method of treatment.—I am, etc.,

JOHN J. WOLFE,
Major, Medical Corps, U.S. Army.

Timing of Schäfer's Method

SIR,—A visit to a military hospital, where the registrar kindly provided me with copies of *Amendments to R.A.M.C. Training*, 1935, cleared up the question of the timing of Schäfer's method therein given. Before Aug., 1940, the timing given was exactly as quoted in my letter of July 8 (p. 57). Brought out in Aug., 1940, *Amendments No. 6* altered the timing, making it identical with that given in *First Aid to the Injured* and the Royal Life-Saving Society's booklet. Dr. Samuel Hales (Aug. 12, p. 224) is therefore correct, for uniformity does now exist, and my letter of July 8 loses its point. Anyone ordering a copy of *R.A.M.C. Training*, 1935, would be wise at the same time to order copies of all the *Amendments*, since these apparently are not otherwise provided.

By some confusion of thought Dr. Samuel Hales describes my accurate quotation as "misleading." What really is misleading is the existence of different copies of the same manual, some giving one timing and some the other. The reason for this is now clear. There must be hundreds of copies printed before Aug., 1940, in use for Home Guard training, etc., and many others besides myself must have been misled. This correspondence should certainly help to clear up "the erroneous impression which has been created."—I am, etc.,

Crowthorne, Berks. E. F. CHAPMAN.

Ascorbic Acid in Gingivitis

SIR,—In the article by Stamm, Macrae, and Yudkin on the value of ascorbic acid in the treatment of gingivitis (Aug. 19, p. 239) they describe how their patients chew the tablets. Of course, in spite of the N.C.O.s, they get little or no ascorbic acid. The tablets are ground to a fine state, the acid comes into intimate contact with the O_2 of the air, and, being a strong reducing agent, is immediately oxidized. It is not sufficient to administer a therapeutic agent; it must be shown to be absorbed; and there are other factors, even if the tablets are swallowed whole, which interfere with its absorption—e.g., the *p*H of the gut and the presence of tannic acid from tea or coffee. Therefore, until its absorption is proved there are no grounds for claiming that it is useless (McMillan and Inglis, ibid., p. 233; and annotation on dehydration).—I am, etc.,

E. P. EVANS.

Lay Psychotherapy

SIR,—Your correspondent the Rev. Horace Dowling has called attention (Aug. 12, p. 225) to the apprehension naturally felt by many members of the general public as to the dangers of psychotherapy when administered by untrained personnel. But he appears to fall into the error commonly assumed by all those outside the medical profession that the magic letters after a doctor's name confer magic powers, and that all that a doctor says or does is good. But doctors themselves would be among the first to agree that in the training of the ordinary medical student, who later graduates into the ordinary family

doctor, there is little time for psychotherapy, and that therefore the untrained doctor is just as much a danger to the community as an untrained layman. Your correspondent draws a distinction between those who are skilled in psychotherapy and those who are unskilled, but fixes the dividing line between the sheep and the goats at the qualifying examination for medical degrees. Surely the only criterion in this matter is whether a psychotherapist has been trained in psychotherapy. The case for restricting the practice of psychotherapy to the medical profession alone is rapidly losing support, and the view is gaining ground that psychotherapy, like dentistry and massage, demands a special training on its own account, and that this training might quite properly be given independently of medical qualifications.

There are many highly skilled psycho-analysts whose results both clinically and in research are as satisfying as those of any medical psychologist. Among them are Mrs. Melanie Klein and Dr. Susan Isaacs, neither of whom holds medical qualifications, the supreme value of whose pioneer work, particularly in the psycho-analysis of children, is fully recognized by all medical men who are acquainted with it. All lay analysts who are recognized by the Institute of Psycho-Analysis are under covenant not to accept patients for treatment except from a medical man. In this respect they are exactly on a par with chartered physiotherapists and other registered medical auxiliaries. The sweeping condemnation of all lay psychotherapy should therefore be modified to exclude those responsible practitioners who, although unqualified in the medical sense, have devoted their life-work to the specialized knowledge necessary for this branch of healing.—I am, etc.,

Hayle, Cornwall. D. STANLEY-JONES.

The Surgeon and the Anaesthetic

SIR,—I have read with interest the letters of Drs. Ayre and Westell (Aug. 19, p. 254). One point seems to have been overlooked: if a patient dies on the operating table the only person held responsible by the coroner at an inquest is the anaesthetist. It is therefore the duty of all anaesthetists to place themselves in such a position that they can answer two questions: (1) Was the anaesthetic the right one for the patient and type of operation? (2) Was the anaesthetic administered with due skill? Thus all anaesthetists must judge each case on its merits, and not be provoked by the surgeon into giving an anaesthetic which makes the surgeon's task easier at the expense of the patient.

Skill can only come from experience, and too much should not be expected of a newly qualified man. I always answer a surgeon who asks me to push the patient deeper by asking if I can change places with him.—I am, etc.,

Birkenhead Municipal Hospital, Cheshire. JOHN HERBERT HANNAN.

The D.P.M. Examination

SIR,—The letter from my anonymous colleague "Major, R.A.M.C., Senior Psychiatrist" (July 15, p. 102), raises a matter of much interest and importance.

The D.P.M. examination has certainly acquired an excessively neurological bias. The origin of this is a matter for speculation. Is it the reaction of the older school against the concept of the "disembodied mind" held by some analytical psychiatrists, or is it a guilt reaction on the part of those who have sought to cure cerebral tumours by psychotherapy? Possibly the explanation lies in the fact that there is no diploma in neurology.

The present form of the neurological examination appears to be designed to test the candidate's ability as a specialist in neurology. An understanding of the relationship between organic and psychogenic factors in such conditions as epilepsy and migraine, and an appreciation of the psychological manifestations of certain neurological disorders, are certainly of importance to the psychiatrist, but is neurology otherwise any more important than other branches of general medicine, of which a psychiatrist needs a full knowledge but which are entirely ignored by the D.P.M.?

Your correspondent's remarks on "psychiatry, psychology, or mental deficiency" and again "psychological medicine or mental deficiency" call for comment. Surely the study of mental deficiency is an integral part of psychological medicine or psychiatry, and not a subject apart; Army psychiatry alone suffices to illustrate this point. "Mental deficiency" has too long been envisaged as a matter of clinical oddities such as epiloia and naevoid amentia by those with little experience in the subject, whereas its immense sociological importance lies rather in the recognition of behaviour disorders and social inadequacy due to constitutional causes or to disease or injury in childhood.

The ideal pattern for the final part of the D.P.M. examination would appear to be an extension of that proposed by the Royal Medico-Psychological Association immediately before the war. There should be a paper and viva covering all branches of psychiatry and those aspects of neurology, endocrinology, etc., which have a direct bearing on the subject: then there should be a further paper and viva designed to test the candidate's more intimate knowledge of the particular branch in which he has had special experience. The examiner in the special part of the examination should be a psychiatrist experienced in that particular branch. Subjects such as psychosis, psychoneurosis, mental deficiency, delinquency, and child guidance could each be dealt with in this manner.—I am, etc.,

Aberystwyth. C. GUY MILLMAN, Major, R.A.M.C.

Ministry of Health's Social Survey

SIR,—In an answer by the Minister of Health to a question put simultaneously by General Clifton Brown and by myself (*Hansard*, Aug. 3, col. 1643) and reproduced in your issue of Aug. 19 (p. 257), the Minister justifies the procedure criticized by us on the ground that "the survey is providing information which is essential to a proper understanding of health statistics, and which cannot be attained in any other way."

The procedure is described in greater detail in the monthly bulletins of the Ministry of Health for April, May, and June, 1944. It would seem that under this procedure lay visitors descend upon selected members of the public and submit a questionary designed to ascertain the incidence of illness and injuries. The questionary includes inquiries as to the character of the past illnesses—usually self-diagnosed—of the persons visited, and further inquiries as to the number of visits made, either at their homes or to doctors' houses, by the family practitioner in charge of the patient. No reference would seem to have been made to the doctors concerned in checking either the diagnoses or number of visits alleged to have been made.

In certain well-attested instances the visitor, zealous to acquire merit with the Ministry, has insinuated that the patient would receive much better attention under the proposals for the future medical service outlined in the White Paper. The value to "a proper understanding of health statistics" of data so compiled would seem questionable. The report of the survey is contributed by the medical statistician to the Ministry of Health, a salaried Civil Servant whose experience of medical practice would seem to have been negligible, but no other check of the returns thus made would appear to have been carried out.

This method of survey seems to have been initiated by the Ministry of Information when Mr. Duff Cooper was the Minister, and the description of the persons thus employed as "Cooper's snoopers" contributed materially to the demise of that effort under the storm of ridicule which followed in Parliament and in the Press.—I am, etc.,

House of Commons. E. GRAHAM-LITTLE.

The G.P. and Service Medicine

SIR,—In spite of the lapse of time I feel that a few words on the above subject by a former G.P. would not be amiss. It is a peculiar fact that so far all the letters, with the exception of one from a civilian colleague, have been from specialists. Now specialists in the medical services, though not given such a great degree of variety, do have the opportunity to practise their specialty to a greater or less degree. But in what branch can the G.P. take his place? The usual answer is as an R.M.O. Granted, the "joy and spirit of comradeship," as Major Kean says, will be there, unless the M.O. is an obvious

misfit, but as soon as the relief from overwork in wartime general practice is over, and indulgence in extra alcohol and short hours have served their turn, the G.P. wants to get back to the work for which he has been trained. Regimental work does not give him this; the excitement of action is probably less than 5% of his service, the remaining 95% is boredom—the usual percentage of any war. An R.M.O.'s duties, besides inoculations, inspections, and advising the C.O. on a few aspects, consists of "knowing his men" and seeing them on sick parade, when any sick must immediately be sent to hospital as the equipment provided lacks the essentials for diagnosis—auriscope, microscope, sphygmomanometer, etc. To get to know his men well is difficult because he holds a commission, and to increase further the mistrust is his "friendliness" with the C.O. In addition, the wife, family, and home surroundings are unknown except through censorship.

In the absence of enemy action G.P.s suffer from intense boredom after about a year unless their interest in medicine has lapsed. Being a C.D.O. in a base hospital is often little better than being a third-year dresser in the medical or surgical wards and little responsibility is given him, the M.O., unless a "specialist," being incapable of making a diagnosis or prescribing treatment without supervision. It is better, I believe, to be in an advanced hospital centre. Another alternative is to become a soldier in a collecting unit, and see even less medicine in a job which could often be carried out satisfactorily by an infantry officer with first-aid training. A further alternative is to become an administrative officer—second in command of a hospital, etc.—and see no medicine at all, unless the specialists are interfered with. Finally, the only way a G.P. can hope to do any medicine is to become a graded specialist, often in a subject in which he is not keenly interested but which is the least of the "evils."

These few remarks, in my opinion, more truly represent the G.P.'s view than those previously published. The inevitable result of either an Army or a State service is the abolition of the "family doctor," and in his place a sergeant of the R.A.M.C. referring the majority of cases to dozens of specialists of lower qualifications than is the case at present.—I am, etc.,

D. S. PIPER,
Capt., I.M.S., I.A.M.C.

Bombay.

Seeing is Believing: Medical Films

SIR,—The annotation on seeing is believing (Aug. 26, p. 281) invites a reply. The Medical Standing Committee of the Scientific Film Association is ready to answer the query: "Who is to sponsor such films, and with what immediate and remote objects?" This standing committee is ready for the following immediate duties: (1) to "sponsor" medical films of approved quality, both medical and photographic; (2) to "appraise" medical films, and especially those for instructional use; (3) to provide, in fact is in the process of forming, a "nuclear" library of medical films; (4) to receive answered questionaries with details of such films, so that all selected can be catalogued in a central medical film library as soon as possible after the cessation of hostilities; (5) to help with suggestions as to the making of medical films: (6) to arrange for the exhibition of such films.

We greatly hope that every medical practitioner who has made a medical film will write at once to Dr. Seymour Reynolds, 14, Hopton Road, Streatham, S.W.16, for a copy of the medical film questionary. The matter is really urgent, and we ask for prompt co-operation.—We are, etc.,

W. MCADAM ECCLES,
Chairman.
S. J. REYNOLDS,
Hon. Secretary.
Medical Standing Committee of the Scientific Film Association.

P. G. Boman (*Ann. intern. Med.* 1944, **20**, 779), who records seven cases of primary carcinoma of the jejunum and ileum, states that this condition is relatively rare and difficult to diagnose. Adenocarcinoma of the annular constricting type is the commonest variety. Few cases are diagnosed before obstruction symptoms have appeared and metastases are present. Careful evaluation of early symptoms, a thorough *x*-ray examination of the small intestine and exploratory operation are needed to improve on present results.

Obituary

G. W. FITZ-GERALD, M.D., F.R.C.O.G.

Dr. Gordon William Fitz-Gerald, O.B.E., T.D., who died on Aug. 18 at West Didsbury, Manchester, aged 72, studied medicine in Edinburgh, Paris, and Dublin, graduating M.B., C.M.Ed. in 1898, taking the L.M. of the Rotunda Hospital in 1899, and proceeding M.D. in 1901. After holding the post of senior assistant master at the Rotunda he began gynaecological practice in Manchester, and was elected to the honorary surgical staff of the Clinical Hospital for Women and Children—now the Northern Hospital; later he was appointed to the specialist staff of the Manchester Municipal Hospital, and lecturer to the nurses there.

Dr. Fitz-Gerald became well known as a consultant and writer on his special subject, taking part in the local scientific meetings, and was for a time president of the North of England Obstetrical and Gynaecological Society. He also acted as examiner for the medical degrees of Durham University and for the School of Medicine in Cairo. He was one of the first to be elected F.R.C.O.G. in 1929, in which year he held office as vice-president of the Section of Obstetrics and Gynaecology at the Annual Meeting of the B.M.A. in Manchester. For many years he was a prominent member of the Northern Counties Lawn Tennis Club and of the Didsbury Golf Club, becoming president of each. He was also one of the best-known croquet players in the district, and will be remembered by many onlookers for his skill in this most deliberate of all outdoor games. In 1917–19 he was in command of the Fusehill Hospital, Carlisle, with the rank of lieut.-colonel, R.A.M.C.(T.), and during the present war he was for a time in charge of the Didsbury Military Hospital. His chief contributions to medical literature were on post-partum haemorrhage and malignant disease of the vagina and cervix.

H. ALEXANDER FRANCIS, M.B.

Dr. Alexander Francis of Wimpole Street, who for many years practised as an asthma specialist in London, died at West Hoathly on Aug. 13. He was born at Brisbane on Aug. 11, 1863, the third son of Arthur Morley Francis, a police magistrate and member of the Legislative Assembly of Queensland.

He was educated at Brisbane Grammar School and entered St. John's College, Cambridge, in 1883. At Cambridge he was captain of the Lady Margaret Boat Club, won the Pearson and Wright Sculls, and rowed in the university trial eights. He entered St. Bartholomew's Hospital in 1886, where he worked under Sir William Savory, Howard Marsh, and Dr. James Andrew. In his autobiography *Then and Now* (Chapman and Hall, 1935) he gives a most interesting account of Savory and his opposition to Lister. It was, however, working as clinical assistant to his cousin, Dr. Greville McDonald, at the Throat Hospital, Golden Square, that he first became interested in what was to be his life-work. He took the M.B., B.Ch.(Cantab.) in 1890, intending to return to Queensland. But before doing so he was told that the Cambridge degree was practically unknown in the Colonies, and if he did not take the M.R.C.S., L.R.C.P. people would think he was not properly qualified. So he also took the Conjoint diplomas in 1890. For two years he was in charge of bush hospitals in the back blocks of Queensland, where he was the only surgeon, physician, and obstetrician for an area of 100 square miles. It was an experience which he always said was of inestimable value to him in later life. Then he started in Brisbane as an ear, nose, and throat surgeon, at that time an almost unknown specialty. It was here that he first became interested in asthma, and in his autobiography he gives a vivid account of how the treatment, later associated with his name, originated.

On a visit to England in 1902 he read a paper at the Clinical Society on the treatment of asthma which caused much interest and not a little hostile criticism. His results, however, were so impressive that he was encouraged to return to practice in this country; he did so, and for the next 40 years practised in the Harley Street area, expounding his views on the aetiology, symptoms, and treatment of asthma at meetings of the British Medical Association, in the medical journals, and in two books *Asthma in Relation to the Nose* (1903) and *Asthma and its Treatment* (1932). He held the view that asthma is a disturbance due to instability of the vasomotor system, and that symptoms are caused by swelling of the bronchial mucosa, thus narrowing the lumen, and not by spasm of the bronchial musculature—the usual explanation. The rapid

effect of adrenaline in reducing swelling seems to support this view of his, as does also its success in the associated condition of giant urticaria and angioneurotic oedema. His theory was that, by stabilizing the vasomotor mechanism, asthma in a large percentage of cases, particularly if the blood pressure was high, could be completely stopped; and that, moreover, when the vasomotor system had been stabilized the usual irritants no longer produced an attack. His method of treatment was to cauterize *lightly* certain asthmogenic spots on the mucous membrane of the nasal septum. By this means he obtained striking results over many years, and earned the gratitude of innumerable patients. He particularly emphasized the fact that the cauterization must be extremely light—a point overlooked by many who attempted to carry out his treatment.

Like his father, he was a pioneer. He was interested in every new advance in medical science, and kept in touch with modern thought. He was one of the oldest members of the B.M.A., one of the earliest presidents of the Queensland Branch, which he helped to found, and he was on the Central Ethical Committee for many years in London and on three occasions a member of Council. In his life he was almost selfless. He literally spent it in helping others. On his 81st birthday, two days before he died, he was still seeing patients. He was twice married, and is survived by two daughters and a son who is also an ear, nose, and throat surgeon.

J. J. A.

W. KNOWSLEY SIBLEY, M.D.

We regret to announce the death of Dr. W. K. Sibley, consulting physician to the St. John's Hospital for Diseases of the Skin.

Walter Knowsley Sibley, the eldest son of the late Mr. S. W. Sibley, F.R.C.S., was born in 1862. He was educated at University College School and Pembroke College, Cambridge, where he took a degree in natural sciences. He received his medical training at the Middlesex Hospital, qualifying in 1886. He took the M.D.Camb. and the M.R.C.P. in 1891. He was house-surgeon at the Middlesex, and house-physician at the Brompton Hospital. At one time Sibley was lecturer to the London School of Dermatology and physician to the North-West London Hospital. He held office in many medical societies, being at one time chairman of the Westminster Division of the Metropolitan Counties Branch of the B.M.A. Among his publications were *The Treatment of Diseases of the Skin*, and articles in various medical journals on the same subject. "He was," a colleague writes, "a friendly, popular, and congenial colleague, a vivid and energetic personality; and to the end was keenly interested in all that appertained to his special subject. A keen tennis player, he played regularly at his club until well past his seventieth year."

We regret to announce the death on August 18 at Douglas, Isle of Man, of Dr. CHARLES SATCHELL PANTIN, O.B.E., consulting surgeon to Noble's Isle of Man Hospital and surgeon to the Governor's Household. Dr. Pantin studied medicine at Guy's Hospital, graduated M.B., B.S.Lond. in 1892, and took the M.D. and F.R.C.S. in 1894, after serving as house-surgeon at Guy's and house-physician and house-surgeon at the Victoria Hospital for Children, Chelsea. In September, 1896, he was appointed the first assistant honorary surgeon to Noble's Hospital under a new rule of the committee, and in 1906 he became full surgeon. During his long period of service on the visiting staff of the hospital Dr. Pantin established himself firmly in the affections and goodwill of his colleagues and the community, and no medical man in the island stood higher in the esteem of Manx people. He joined the B.M.A. in 1906, was elected president of the Isle of Man Branch of the Association last year, and had been acting honorary secretary of the Isle of Man Medical Society. During the last war he worked as surgeon to the Fargo Military Hospital. In 1936 his public services were rewarded by appointment as an Officer of the Order of the British Empire. Two of his five children entered the medical profession—Dr. Dorothy Pantin and Dr. Charles Guy Pantin.

The following well known medical men have died abroad: Dr. ARCHIBALD JOHNSTON BUIST, emeritus professor of gynaecology at the Medical College of Charleston, aged 71; Prof. CARL HEGLER, director of the St. George's General Hospital and extraordinary professor of internal medicine at Hamburg, aged 66; and Geh. San. Rat. Prof. HERMANN WEBER, formerly director of the Medical Department of the Lazarus Hospital, Berlin, aged 78; Dr. ERNST EDENS, the eminent cardiologist and professor of internal medicine at Dusseldorf, aged 68; Prof. FRANZ LINKE, director of the Institute for Meteorology and Geophysics at Frankfort University, one of the leading German bioclimatologists; Dr. ENRIQUE A. BOERD, professor of obstetrics at the University of Buenos Aires; and Dr. MAXIMO M. CASTEIGTS and Dr. ARTURO MO, of Buenos Aires.

The Services

Squad. Ldr. Ernest Reginald Brown, R.A.F.V.R., has been appointed O.B.E. (Military Division), and Corporal George Greenwood, R.A.F.V.R., has been awarded the B.E.M. (Military Division). The citation in the *London Gazette* reads as follows:

"In February, 1944, a Mosquito aircraft crashed and caught fire when approaching to land. The pilot was killed instantly, but the observer was alive, and rescue parties tried in turn to extricate him from the blazing wreckage. Party after party failed, and each attempt became more difficult owing to the increasing heat of the fire in the cockpit area of the wreckage. Eventually Squad. Ldr. Brown, the station medical officer, and Corporal Greenwood made a final and desperate effort as the situation had become critical because the supplies of foam were exhausted temporarily and the fire remained unchecked for some minutes. If their effort failed it was clear that immediate amputation of the observer's leg was the only way by which he could be released. Displaying extreme courage, Squad. Ldr. Brown and Corporal Greenwood withstood the intense heat of the flames and, by the skilful use of the tools at their disposal, succeeded in breaking away the wreckage which was trapping the observer's leg. They then removed the airman to the ambulance. While first aid was being rendered, Squad. Ldr. Brown returned to the wreckage to make certain that the pilot was not alive. This officer and airman displayed outstanding courage and determination."

CASUALTIES IN THE MEDICAL SERVICES

Squad. Ldr. JOHN HENRY PERCIVAL GAUVAIN, M.B., B.Ch., was killed on Aug. 14 in a flying accident. He was born in August, 1915, studied medicine at Cambridge and St. Bartholomew's, qualified in 1939, and was appointed to a commission in the Medical Branch of the R.A.F.V.R. on Sept. 27, 1939. At the date of his death he was serving over-seas.

Reported missing.—Surg. Lieut. C. J. S. Green, R.N.V.R.

DEATHS IN THE SERVICES

Major-Gen. GODFREY TATE, C.I.E., I.M.S., died on July 29 after a varied and distinguished career at the age of 71. He was educated in Belfast and at Trinity College, Dublin, where he graduated in medicine in 1896. In 1898 he took a good place in the entrance examination for the I.M.S., and during his early military service he was medical officer to an Indian cavalry regiment. He saw active service in Chinia in 1900 and on the N.W. Frontier in 1908, with medals for each campaign. In 1913–16 he held the important post of surgeon to the Commander-in-Chief, India, and was civil surgeon in Simla during the next five years. In 1920 he was appointed professor of midwifery and gynaecology at the Lahore Medical College, where he found scope for his surgical abilities. On reaching the administrative grade he was successively Chief Medical Officer, N.W. Frontier Province, Acting Inspector-General of Civil Hospitals, Punjab, and Surgeon-General with the Government of Bengal, when he was promoted to the rank of major-gen. and was awarded the C.I.E. In these posts he proved to be an able and popular administrator, and in 1926 he was appointed to be an Honorary Surgeon to the Viceroy. His high qualities led to his being appointed in 1931 to be Governor and Medical Superintendent, King Edward VII Convalescent Home, Osborne, the first such appointment of a medical service officer other than those of the R.A.M.C., and he held the post with distinction for five years. He was also devoted to hunting, shooting, and golf. He will be missed by his many friends; his wife survives to mourn his loss.

Universities and Colleges

McGILL UNIVERSITY, MONTREAL

A diploma course in tropical medicine is offered for the first time during the session 1944–5. Its object is to train medical graduates to deal with medical problems which may be met in tropical areas. The course is divided into several units, each consisting of approximately three months' work. Three units are required to qualify for the diploma. In this way the course will meet the needs of individuals with different previous training. A unit of three months in parasitology and tropical medicine is compulsory for all. Students who have recently graduated will be offered training in the out-patient departments of the hospitals associated with the University, and in the child welfare clinics. They will also have an opportunity to receive three months of practical experience in an approved hospital in the Tropics. This training will satisfy the requirements of a fifth year of professional training for students who wish to take the examinations of the Dominion Council. The course is also suggested as a refresher course for medical graduates who have been

working in the Tropics, and who wish to take advanced work in parasitology and other branches related to tropical hygiene.

Unit I.—The course in tropical medicine and parasitology is a basic one, covering bacteriology, parasitology, and medical entomology as applied to tropical medicine and includes an introduction to nutrition and hygiene as applied to the Tropics, as well as a systematic review of tropical diseases. Ten weeks of this course are given at the Institute of Parasitology at Macdonald College, Ste. Anne de Bellevue. Special prominence is given to laboratory work.

Unit II.—The course in the care of ambulatory patients is arranged to give supervised experience in the important diseases common to tropical and temperate climates. Disease will be considered in its various aspects as a community problem. Syphilis, dermatology, tuberculosis, child welfare, paediatrics, and haematology will be stressed.

Unit III.—Facilities have been arranged for clinical experience in the Tropics, under experienced supervision. The facilities of the Demerara Bauxite Company have been made available, and other opportunities will also be arranged in the Caribbean area.

The fee for the complete course will be $250.000. Units of the course may be taken consecutively or separately as desired. Inquiries should be sent to the Secretary of the Faculty of Medicine, McGill University, Montreal, Canada.

UNIVERSITY OF LONDON

KINGS' COLLEGE HOSPITAL MEDICAL SCHOOL

Awards have been made as follows:

Burney Yeo Scholarships: R. C. Read, G. W. C. Johnson, N. Tate. *Raymond Gooch Scholarships:* C. S. C. Roberts, K. J. M. Carruthers. *Epsom College Scholarship:* Norman Lees. *Anatomy and Physiology Scholarship:* Divided between Daphne Baker and A. N. Husain. *Pathology Exhibition:* P. H. A. Sneath. *Science Scholarship:* G. E. Langley.

WESTMINSTER HOSPITAL MEDICAL SCHOOL

An examination for an Entrance Scholarship in Anatomy and Physiology will be held on Sept. 19 and 20. The examination consists of a paper of three hours in both subjects. Candidates should apply to the Secretary of Westminster Hospital Medical School, 17, Horseferry Road, London, S.W.1, for further particulars not later than Sept. 5.

UNIVERSITY OF BIRMINGHAM

A course of six lectures for industrial medical officers and others will be held at the Medical School, Hospitals Centre, Birmingham, 15, on the undermentioned dates, at 4 p.m. in the Physiology Lecture Theatre:—Sept. 11 and 12: "Industrial Dermatitis," Dr. E. Baylis Ash and Dr. Cranston Walker; Sept. 18 and 19: "Problems of Vision and Colour Vision," Prof. H. Hartridge, M.D., F.R.S.; Sept. 25 and 26: "Deafness: its Disabilities, Causes, Prevention, and Alleviation," Mr. C. S. Hallpike. The fee for the course is £1 1s., payable in advance to the Secretary of the University, Edmund Street, Birmingham. Nurses engaged in industry are invited to join the course at a fee of 5s.

EPIDEMIOLOGICAL NOTES

Discussion of Table

In *England and Wales* during the week there was a big drop in the incidence of the common infectious diseases; notifications of measles, scarlet fever, whooping-cough, and diphtheria fell by 359, 326, 324, and 43 respectively. The decrease in scarlet fever and whooping-cough was general throughout the country, the number of notifications of scarlet fever being the lowest since the beginning of 1942. The greatest fall in the incidence of measles was in Lancashire, with 83 fewer cases. In contrast to the remainder of the country the south-western counties and Wales had a slight increase in measles, the notifications rising from 319 to 366. Eight of the 12 cases of typhoid were notified in Gloucestershire (Gloucestershire C.B. 3, Gloucester R.D. 5).

The notifications of dysentery were the lowest during the present year. The only fresh outbreak of any size was Hertfordshire 18 (Ware R.D. 15), the other big centres of infection being Lancashire with 30 cases, London 19, and Glamorganshire, Cardiff C.B. 12.

In *Scotland* there was a small general fall in the incidence of infectious diseases. Notifications of cerebrospinal fever exceeded the preceding week's low total by 10. There were 40 fewer cases of dysentery; Edinburgh and Glasgow, with 21 and 24 cases, were still the chief centres of infection.

In *Eire* only 14 cases of measles were recorded, compared with 83 in the preceding week. Twenty-three cases of typhoid were notified, 10 from Dublin C.B., the remainder being isolated cases dispersed throughout the country; this is the second large outbreak of typhoid in Eire during recent months.

Week Ending August 19

The notifications of infectious diseases in England and Wales during the week included: scarlet fever 1,068, whooping-cough 1,603, diphtheria 398, measles 1,606, acute pneumonia 345, cerebrospinal fever 34, dysentery 248, paratyphoid 5, typhoid 8.

No. 32

INFECTIOUS DISEASES AND VITAL STATISTICS

We print below a summary of Infectious Diseases and Vital Statistics in the British Isles during the week ended Aug 12.

Figures of Principal Notifiable Diseases for the week and those for the corresponding week last year, for: (a) England and Wales (London included). (b) London (administrative county). (c) Scotland. (d) Eire. (e) Northern Ireland.

Figures of Births and Deaths, and of Deaths recorded under each infectious disease, are for: (a) The 126 great towns in England and Wales (including London). (b) London (administrative county). (c) The 16 principal towns in Scotland. (d) The 13 principal towns in Eire. (e) The 10 principal towns in Northern Ireland.

A dash — denotes no cases; a blank space denotes disease not notifiable or no return available.

Disease	1944 (a)	(b)	(c)	(d)	(e)	1943 (Corresponding Week) (a)	(b)	(c)	(d)	(e)
Cerebrospinal fever	52	4	25	1	—	46	—	23	1	3
Deaths		1	—				—	—		
Diphtheria	428	18	103	64	16	491	28	151	59	24
Deaths	8	1	—	1	—	16	1	2	3	—
Dysentery	127	19	78	—	—	149	20	100	—	—
Deaths				—	—		—		—	—
Encephalitis lethargica, acute	2	—	—	—	—	2	—	—	—	—
Deaths		—					—			
Erysipelas			33	9	2			36	8	4
Deaths		—					—			
Infective enteritis or diarrhoea under 2 years				43					137	
Deaths	70	4	14	15	4	39	5	10	24	16
Measles*	1,795	36	45	14	29	1,476	100	19	18	6
Deaths	2	—	—	—	—	—.	—	—	—	—
Ophthalmia neonatorum	67	1	19	—	—	108	7	21	—	—
Deaths										
Paratyphoid fever	8	1	6†	1(B)	—	6	1	2	—	1
Deaths	—	—	—	—	—	—	—	—	—	—
Pneumonia, influenzal‡	356	10	2	—	3	346	23	2	—	1
Deaths (from influenza)	8	—	—	—	—	7		—	—	—
Pneumonia, primary			117	16				120	16	
Deaths		20		4	5		12		7	13
Polio-encephalitis, acute	3	—				—	—			
Deaths		—					—			
Poliomyelitis, acute	12	—	9	—	2	11	—	—	—	—
Deaths		—					1			
Puerperal fever		2	9		—		3	13		—
Deaths							—			
Puerperal pyrexia§	143	6	14	1	—	118	11	7	2	2
Deaths		—								
Relapsing fever	—	—			—	—	—			—
Deaths										
Scarlet fever	1,084	22	169	26	27	1,558	155	221	32	42
Deaths	1	—	—	—	1	3	—	—	—	—
Smallpox	—	—	—	—	—	—	—	—	—	—
Deaths				—	—				—	—
Typhoid fever	12	—	2	23	4	10	—	3	3	—
Deaths	—	—	—	1	1	—	—	—	1	—
Typhus fever	—	—	—	—	—	—	—	—	—	—
Deaths				—	—				—	—
Whooping-cough*	1,444	61	64	30	13	1,855	137	57	21	33
Deaths	14	4	7	2	—	13	1	4	—	1
Deaths (0–1 year)	320	20	30	20	10	270	29	50	56	38
Infant mortality rate (per 1,000 live births)										
Deaths (excluding still-births)	3,972	646	499	153	106	3,562	513	495	169	112
Annual death rate (per 1,000 persons living)			11·5	9·9	¶			11·2	11·1	¶
Live births	6,175	491	854	278	248	6,027	783	873	371	263
Annual rate per 1,000 persons living			17·4	18·0	¶			17·8	24·4	¶
Stillbirths	197	20	39			184	20	35		
Rate per 1,000 total births (including stillborn)			44					39		

* Measles and whooping-cough are not notifiable in Scotland, and the returns are therefore an approximation only.

† Paratyphoid A 1, B 5.

‡ Includes primary form for England and Wales, London (administrative county), and Northern Ireland.

§ Includes puerperal fever for England and Wales and Eire.

¶ Owing to evacuation schemes and other movements of population, birth and death rates for Northern Ireland are no longer available.

Medical News

Air Marshal Sir Harold Whittingham will give an illustrated address entitled "Aviation's Contribution to Preventive Medicine" on the afternoon of Thursday, Sept. 21, at the Royal Institute of Public Health and Hygiene, 28, Portland Place, W.

At the opening of the new session at Westminster Hospital Medical School the inaugural address will be delivered by Sir John Fraser, Bt., Principal and Regius Professor of Edinburgh University, in the Meyerstein Lecture Theatre on Monday, Oct. 2, at 3 p.m. Tea will be served in the School.

Dr. Robert G. Cochrane, who for nine years has been a missionary of the Church of Scotland and medical officer at the Lady Willingdon Leprosy Sanatorium at Chingleput, South India, has been appointed Principal of Vellore Medical College, a missionary institution originally founded for the training of women doctors and nurses.

The Association of Scientific Workers has now published its report to the University Grants Committee on the future development of university teaching and research in fundamental and applied science (Oxonian Press, Queen Street, Oxford; 1s.). Discussion is confined mainly to the ways in which the rapid extension of scientific knowledge and its application are affecting the universities, chiefly in the physical and biological sciences and related applied branches. The subject is dealt with under six main headings: degree courses; teaching; research; applied science; extra-mural activities; and the post-war problem; with appendices on salary scales for academic and technical staff.

National scales of salaries for 30,000 nurses employed in mental hospitals in England and Wales are recommended in the report of the Mental Nurses Subcommittee of the Nurses' Salaries Committee. Some of the salaries are: women, from £380 to £600 with emoluments worth £200 for the matron of a mental hospital or institution of 670 beds or over which is a training school; staff nurses, £120, rising by £5 a year to £160, with emoluments of £90. Men, non-resident chief nurse of a hospital of 670 beds or over which is a training school, £450 to £620, plus £5 emoluments (resident £315 to £485, plus £140 emoluments); staff nurse, 95s. a week, rising by 5s. to 110s. if non-resident, with emoluments to the value of 2s. weekly, and 62s. 6d. rising by 5s. to 77s. 6d., with emoluments valued at 34s. 6d. weekly if resident. Among other recommendations are: new appointments to posts above the grade of ward sister or charge nurse to be filled only by State-registered nurses; free medical and surgical in-patient treatment; uniform free of charge; one complete day off duty a week and 28 days' annual leave. The Rushcliffe Committee have now to report on superannuation and pension rights.

In St. Dunstan's Hospital wards there are, regrettably, some wounded men just returned from the fighting in France, who will, to quote Sir Ian Fraser in his annual report, "learn to be blind." For nearly thirty years St. Dunstan's has been teaching the blind a new "design for living," how to look after their own personal needs, to read, to typewrite, to follow certain occupations such as carpentry, boot repairing, etc., and even to swim and ride. St. Dunstan's method is to give comfort and hope in the early stages of blindness, then preliminary training after health has returned, and finally vocational and professional training to those who are fit for it. Veterans of the last war (1,800 survive) are still being looked after, and some hundreds of men blinded in the present war, including Canadians and Americans, have passed through St. Dunstan's. Sir Ian adds no appeal in so many words, but St. Dunstan's is a cause which to-day more than ever deserves generous support.

A report of the midwifery cases attended by the Queen's Institute of District Nursing and by village and other nurse-midwives in 1943 states that the shortage of domestic help has resulted in a larger number of patients entering hospital, and therefore the number of domiciliary cases was fewer by 4,723. The maternal mortality rate, though slightly higher than in 1942, was the second lowest on record, being 1.35 per 1,000 live births. The total number of cases attended where no doctor was engaged was 84,459; 22,771 of these were in primiparae. Medical aid was summoned for the mother in 28,721 cases (34.0%)—that is, during pregnancy 5,681 (6.8%), during labour 19,868 (23.5%), and during puerperium 3,167 (3.7%). Medical aid for the infant was summoned in 5,072 cases (6.0%). The report adds that as ill-health may be due to domestic circumstances of the patients the need for adequate home visiting during the antenatal period cannot be over-emphasized. The integral part of any antenatal scheme must be close co-operation with the doctor, for the summoning of whom in the event of illness or emergency the midwife is responsible.

Letters, Notes, and Answers

All communications with regard to editorial business should be addressed to THE EDITOR, BRITISH MEDICAL JOURNAL, B.M.A. HOUSE, TAVISTOCK SQUARE, LONDON, W.C.1. TELEPHONE: EUSTON 2111. TELEGRAMS: *Aitiology Westcent, London.* ORIGINAL ARTICLES AND LETTERS forwarded for publication are understood to be offered to the *British Medical Journal* alone unless the contrary be stated.

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ANY QUESTIONS?

Injections for Osteo-arthritis

Q.—*Procaine is successfully used for intramuscular injection into painful spots in fibrositis and allied conditions. Has it ever been used for injection into the hip-joint in intractable painful osteo-arthritis, and with any success? Granted full sterile precautions, are there any contraindications to this treatment?*

A.—Various solutions have been injected into osteo-arthritic joints with, at the most, short-lived success. Procaine gives transient loss of pain, and is quite useless for this condition. In fibrositis the action of the fluid is largely mechanical, and saline will do equally well except that the immediate pain is greater, and, therefore, massage and exercises are carried out less willingly.

A Midwifery Anaesthetic

Q.—*I have heard that a new midwifery anaesthetic is being tried out which will render Minnit gas apparatus obsolete for midwives. Can you tell me if this is true, and what it is?*

A.—The Minnitt apparatus for analgesia has rendered yeoman service, but it suffers from the defect that the percentage of N_2O delivered to the patient varies with the depth of respiration. The deeper the respiration the more the gas is diluted with air. Recently experiments have been carried out with nitrous oxide delivered through a Venturi jet. The percentage of N_2O in the resultant mixture here remains substantially constant whatever the flow of gas. The Venturi jet principle has been applied to oxygen therapy, and an explanation of its working is to be found in an article by S. L. Cowan and J. V. Mitchell, "Improved Equipment for Oxygen Therapy" (*British Medical Journal*, Jan. 24, 1942, **1**, 118).

Removal of Tonsils by Diathermy

Q.—*Is it possible to use the galvanic current to destroy infected tonsils by means of "needling," as for small growths, etc.? If so, I should be grateful for details of technique, as I do not find these subjects mentioned in the textbooks.*

A.—The only effect of the galvanic current would be to produce a contraction of the muscles of the pharynx, a sufficient reason for the silence of the textbooks. Diathermy consists in passing a high-frequency current of great power through the body. Used for surgical purposes the small electrode generates intense heat in the tissues in the immediate neighbourhood. Repeated applications can be used for the destruction of growths and similarly for the destruction of tonsils. The modern unipolar apparatus is more convenient in practice, as it is not necessary to use a second large electrode applied to an indifferent area. The procedure is painful, so that an anaesthetic is necessary, but ether must be avoided. The late Dr. Dan McKenzie described the procedure fully in *Diathermy* (Kegan Paul), and a description of diathermy may also be found in *The Nose and Throat* (Arnold) by the late Charles A. Parker.

Vagal Attacks

Q.—*A busy and active practitioner aged 69, who smokes about 12 cigarettes a day, frequently has, after morning surgery followed by a cigarette, and occasionally after a hot bath or a game of golf, a feeling of faintness with sweating and slow pulse (48), but with no loss of consciousness. A cardiologist finds heart and B.P. normal and suggestive of a younger man. Normal pulse 60 to 64. He calls it "vagus vagans" and can only suggest a holiday. The patient has some spondylitis of neck and osteo-arthritis in fingers and elbows. What is the pathology and treatment?*

A.—Faints or syncopal attacks may be due either to diminution of the venous inflow to the heart, as a result of active or passive dilatation of portions of the vascular bed (vascular syncope), or to

failure of the heart to cope with a normal inflow of blood (cardiac syncope). In many faints both factors come into play, and the attacks are known as vaso-vagal attacks. Where, however, vagal inhibition is the chief factor, the term "vago-vagal attack" has been used. At this time of life such attacks are probably due to degenerative changes in the cardiovascular system, though it may be difficult to discover whether the chief lesion is in the heart, the peripheral vessels, or the cerebral circulation. The effects of pressure on the carotid sinus should be examined to exclude the cardiac type of carotid sinus syncope. The oesophagus and stomach should be examined radiologically, as diverticula, pouches, aerophagy, etc., may produce vagus inhibition. Stokes-Adams syndrome is unlikely in view of the moderate degree of slowing of the pulse and the cardiologist's report. The fasting blood sugar should be estimated to exclude spontaneous hypoglycaemia. If these investigations prove negative treatment may be attempted with atropine or belladonna, in full doses, or with ephedrine. Digitalis must be avoided and smoking should be given up. The advice to take a holiday also seems sound, as vagal inhibition may be the result of reflexes which are more likely to be overactive when the patient is tired.

Control of Petit Mal

Q.—*What is the latest treatment of petit mal, and is it possible to control the attacks now? I have a patient aged 14, a girl, who has had them since she was 5; luminal does not seem to have any beneficial results.*

A.—There has been no advance in the treatment of petit mal in the past few years. Bromides and phenobarbital remain the drugs of choice. It is general experience that the hydantoins (epanutin) do not benefit patients with petit mal, although they are very efficacious in many cases of grand mal. Occasionally, however, a patient with petit mal responds well to epanutin, which can be used with advantage in combination with luminal. For a girl of 14 luminal gr. 1/2 t.d.s. with a capsule of epanutin (0.1 g.) should be adequate, but smaller doses might be satisfactory. Dietetic treatment has been discarded by most neurologists now, for the results did not justify the labour and discomfort, and in any case the high fat diet is impracticable in wartime.

Congo Red for Haemoptysis

Q.—*What is the rationale of the use of Congo red in the treatment of haemoptysis?*

A.—Congo red is used in the treatment of haemoptysis because it is said to reduce the clotting time of the blood. It was recommended for this purpose by Wedekind, Becker, and Weinert (*Münch. med. Wschr.*, 1930, **78**, 2049). Its use was described by Morlock and Pinchin in this *Journal* (1934, **2**, 762). They gave intravenously 10 c.cm. of a 1% solution of specially purified Congo red. They state that the injection causes an increase in the monocytes, an increase in the platelets, and an increase in the blood fibrin, as well as a reduction in clotting time. The injection is believed to stimulate the cells of the reticulo-endothelial system. Sometimes the patient has a rigor soon after the injection, but it is stated that this is never severe enough to cause alarm.

Interpretation of G.C.F.T.

Q.—*What conclusions can one draw from a positive gonococcal complement-fixation test? One of my pilots is completely asymptomatic without suggestive history, but has such a positive reaction. One of his friends was having a premarital check-up, and he had his blood taken for G.C.F.T. and W.R. at the same time. The pathological report is positive "+±," presumably not indicating a very strong reaction. Can other infections—e.g., allied Neisserian (meningococcal), or quite unrelated non-specific venereal infections, or even non-infectious disease, give rise to a positive result? Finally, what is one at liberty to deduce from a negative gonococcal complement-fixation test?*

A.—In general the result of a gonococcal complement-fixation test is to be interpreted in much the same way as that of a W.R.; a diagnosis of gonorrhoea should not be founded on a single positive G.C.F.T. any more than one of syphilis should be on a single positive W.R. In the case in question it would be well to have the test repeated, and if it is still positive to advise a clinical overhaul by an experienced venereologist. It has been established that other Neisserian infections, and especially that with *N. catarrhalis*, do occasionally give rise to false positive G.C.F.T.s; there is no evidence that non-specific venereal infections or non-infectious diseases give rise to such reactions. The G.C.F.T. is negative in the early stages of gonorrhoea, usually becomes positive after a week or two if the disease is not treated, and returns to negative at varying times after cure, depending on the length of time the disease has existed, the presence or absence of complications, and whether vaccine has been used or not. A negative test is of especial value as a test of cure if it has previously been positive; it is also of considerable value in the differential diagnosis of cases of epididymitis, prostatitis, arthritis, etc., of obscure origin; where these are due to the gonococcus the test is nearly always positive.

The above remarks apply only to tests carried out in a reliable laboratory; the number of laboratories in this country where reliable G.C.F.T.s are carried out is very limited, mainly owing to the difficulty of obtaining a suitable antigen.

INCOME TAX

Partner Serving Abroad

"Z's" partner is serving in India, and his pay is taxed there. The firm is in the Isle of Man and the partnership arrangement provides that the pay shall be brought into the partnership account for division on the normal basis with the two other partners. Income tax is claimed on this pay by the Isle of Man authorities.

*** We do not think the claim is justified. The pay is not normally regarded as liable to income tax in the country of residence, and we do not think it becomes liable because it is subsequently divided with others. It would be stretching the argument too far to contend that the earnings of an Army officer in India are part of the profits of a practice carried on in the Isle of Man.

"Pay as you Earn"

J. H. holds an appointment in an institution. The scales of salary were increased in April, 1944, with effect as from May 15, 1943. In consequence he received last May an additional payment of £125, from the whole of which income tax was deducted under "pay as you earn." Should he not have the benefit of the 7/12ths cancellation to the extent to which the £125 was earned before April 6, 1944.

*** It should be borne in mind that "pay as you earn" is a system of *collection* of tax, and (with the important exceptions that 7/12ths of the 1943–4 tax is cancelled and that the current year's earnings are now the basis of assessment) does not affect the way in which the ultimate liability for any year is calculated. When J. H.'s earnings for 1944–5 are assessed (sometime after April 5, 1945) the appropriate part of the £125 will be regarded as assessable for 1943–4 and the tax for that year will be recalculated. The result will presumably be to show that J. H. is then entitled to some repayment of tax for 1943–4 and the income tax authorities will deal with the adjustment accordingly. Admittedly this will mean that he is kept out of his money for some months, but we have gathered that this is in accordance with the statutory regulations, and that the Revenue is not prepared to make repayments in such cases until after the end of the present financial year.

LETTERS, NOTES, ETC.

Estimation of Dental Caries

Miss DOROTHY SMITH, L.D.S., writes from Oxford: I wish to correct the description of me as M.B. I am a dentist, not a doctor. Dr. Neely (July 29, p. 160) supports my criticism when he speaks of a distinguished layman, as however distinguished in other fields a layman may be dental examinations are best carried out by persons long trained in the dental profession; but I must apologize to him for not having known that residence in Oxford disqualified me from any criticism at all.

Infant Feeding: A Correction

Dr. SYLVIA DICKINSON (Leeds) writes: In my letter about infant feeding (Aug. 19, p. 255) the meaning of the last sentence of the second paragraph has been altered by the omission of a phrase. After the word "consideration" it should read: "but according to methods that base quantity of feed on age, if any difference, etc."

Concurrent Herpes Zoster and Varicella

Dr. J. FINLAY ALEXANDER (Sevenoaks) writes: I have recently had a case of concurrent herpes zoster and varicella in my own practice. A man of 69, after feeling out of sorts for a few days, began to have a painful neuralgic headache in the left frontal region, and then developed some "blisters" in the painful area. I saw him first on a Thursday, when he had a well-developed herpes of the supra-orbital branch of the fifth nerve, with considerable swelling of the upper eyelid and many vesicles running into one another extending on to the top of the head. He had a temperature of 101.5° F., with definite constitutional symptoms. Next day he was no better, and in the evening he had a shivering fit and his temperature rose to 103° F. When I saw him on the Saturday I found his temperature still 102.5° and there was a typical varicella rash with about 30 spots on both his chest and back. I gave him 2 g. of sulphathiazole and then 1 g. 4 hourly, and in 24 hours he "felt

much better," his temperature came down, and the inflammation of the varicella spots began to subside. In 48 hours the vesicles had dried up and the surrounding redness faded; in fact the rash seemed to abort and reach in 2 days the condition usually seen after 5 or 6 days. The herpes ran a typical, somewhat severe course, the inflammation of the upper lid and swelling of the conjunctiva, with inability to open the eye, being his chief complaints. There was no definite ulceration of the cornea, but he was unable to open his eye for a fortnight owing to oedema of the upper lid, and when this subsided the scabs on the upper lid limited its movement until they separated. The neuralgic pain and altered sensation in the frontal area cleared up slowly in about 6 weeks from the start. In this case the herpes of the fifth nerve developed to its full extent before the varicella rash appeared. I was led to give sulphathiazole because a month previously I had seen a very severe case of chickenpox in a man of 37. He had a rash from head to foot and felt very ill. His temperature rose to, and remained at, 105° F. for nearly 12 hours. After a few doses of sulphathiazole he felt "a new man," and within 24 hours his temperature fell to normal and remained so in spite of the many infected spots.

Dr. MARY BARROW (Birmingham) writes: I have only met one case of these two occurring in the same patient concurrently. On Aug. 3, 1944, a man aged 59 had the eruption of herpes zoster in the mid-thoracic region—a moderately severe attack. The chickenpox vesicles appeared on Aug. 8 and he had a widespread rash by the next day. He does not remember whether he had chickenpox in childhood.

Ascorbic Acid in Treatment of Gums

Dr. K. MALIK, L.D.S. (London, N.1), writes: I was more than ordinarily interested in the article on ascorbic acid and its value in the treatment of gums (Aug. 19, p. 239). Some years ago I was asked to use the ascorbic acid tablets presented to me on a special case or cases. I did so and reported its uselessness to the manufacturers. I would, however, point out that the title "Bleeding Gums" is misleading, as ascorbic acid is of definite use in accelerating healing after extractions. A further point is this: What do the authors mean by a "dummy" tablet? Do they mean one made mostly of sodium bicarbonate? There is a school of thought that says "alkalis will cure any dental disease, including gum disease."

Meigs's Syndrome

Capt. C. BORG, R.A.M.C., writes from the Connaught Hospital, Knaphill: In the article on Meigs's syndrome by Clay, Johnston, and Samson in the *B.M.J.* of July 22 the authors state that previously only one case of this syndrome has been reported in the last 20 years in the British literature—namely, the case by Gild in Dec., 1943. I beg to point out that this statement is incorrect, as I reported a case in the *Journal of Obstetrics and Gynaecology of the British Empire* in Dec., 1941.

Pethidine in Asthma

Dr. F. BEDO HOBBS writes from Farnham, Surrey: I should like to send a note of warning in reply to Dr. Douthwaite's letter (Aug. 5, p. 200), wherein he recommends injections of pethidine for stubborn cases of asthma. I recently saw a woman with persistent urticaria and asthma for whom this treatment was recommended. It gave her so much relief accompanied by a sense of well-being that she had been in the habit of giving herself three injections of 50 mg. daily for several months. Just before coming under observation she had been behaving queerly and had, according to her sister, had twenty-six injections of 50 mg. in the course of three days. When admitted to hospital she was very excitable and talkative and completely irrational and disorientated. Although the pethidine was immediately stopped and sedatives given, she remained in the same state for a week, after which she gradually became quieter and less confused, although she relapsed at times for a further three or four days. As pethidine is now being prescribed more frequently the fact that this drug is not included under the D.D.A. and can be obtained by anyone without a prescription makes one realize that it should not be ordered lightly and without explaining the risk of habit formation to both patient and relatives.

Masturbation in Men

Dr. J. LUXFORD MEAGHER (Victoria, Australia) writes: In your column "Letters and Answers" in the issue of the *Journal* for Jan. 1 appears a note on the subject of masturbation in men. I have read the reply with frank feelings of disgust. The answer concerns the course to be followed by a young man of the Forces who feels disposed to masturbate. He is to be told to adopt this practice deliberately, and while "not attaching any sense of guilt to the act" should not do it too often, and "only as a relief for unbearable sexual tension." Acting on these lines he is assured that his health will not be impaired nor will his future sexual life be prejudiced. The end, of course, cannot possibly justify the means. Abstracting from the moral aspect, I am at a loss to know why, if the practice is intrinsically harmless, a restriction should be placed upon its use. I deny the possibility of frustrating a physiological function in its very nature without harm resulting. Is not the danger of habit formation to be expected? Can the practice be taken up and relinquished at will? I know of at least one case in which the husband, though living under the same roof as his wife, was addicted to the vice. It is precisely those who are weak of will or whose wills are not yet fully developed to whom it appeals. Surely an act universally condemned throughout the ages cannot suddenly, owing to any "trend of opinion," become permissible. Further, it is not within the power of the individual to withhold the consciousness of guilt from any act which his conscience disapproves. The remedy for all unnatural urges is strenuous resistance, reinforced by prayer; also sublimation of those urges, as the answer rightly suggests, by athletic and intellectual interests. To propagate the notion of unnatural vice as the answer does is shocking. To suggest that medical men should lend themselves to the task is the limit.

Corticotrophic Hormone

Dr. R. E. HEMPHILL (Bristol) writes: As a result of the article by Reiss and myself published on Aug. 12 (p. 211) a number of inquiries have been made as to where this preparation may be obtained. So far as I know corticotrophic hormone is not as yet available commercially. The hormone we used was a laboratory product made available through Messrs. Organon.

Agricultural Rehabilitation of War Casualty Cases

G. D. G. writes: According to information received at the Chinese Embassy in London, the Chinese Ministry of War has opened a rehabilitation centre for war-damaged men in Szechuan Province. The first corps of 1,000 soldiers has arrived there and the men are being distributed for work on the land. Several thousand more helpers are required on farms in Britain for the corn, potato, and other harvests. The call-up of men for the Forces is said to leave many farmers facing serious loss, more especially as the embargo on Eire will interfere with the importation of Irish labourers. We shall be dependent on volunteer harvesters from our town-dwellers if these vital crops are to be gathered in. Farmers are offering good pay, food, and accommodation, and the healthiness of open-air life provides an additional advantage. That is one side of the picture. The other side concerns the thousands of soldiers who have become convalescent from their war injuries but who are as yet unfit to resume their former occupations. Their minds, bones, and muscles have been damaged and require to be made good again in as efficacious and natural a way as possible—by occupational therapy. The instruments and appliances of physiotherapy are most valuable up to a certain stage; but, after injured parts have again been induced to function, routine exercises in hospital lack the stimulus of productive work. Though the summer session is well under way it may be possible to accelerate arrangements through the three Service channels and the Ministry of Agriculture to put convalescent soldiers on the land. Whether as cultivators, harvesters, tractor drivers, carters, dairymen, poultry keepers, there are many roles they could fill for the mutual benefit of themselves and the farmers. There is no calling other than agriculture that would so satisfactorily bring these men back to health and fit them for return to civil life, in addition to the important factor of augmenting the national food supply. One has only to enter our hospital wards and see the number of tragic neurasthenic and shell-shock cases to realize the clamant need for treatment by recuperative occupation. There are also few physical injuries that do not favourably respond to functional use in healthy surroundings. The varied work of farm life and the peacefulness of it all never fail to interest men who have come through the inferno of modern warfare.

Chronic Vasomotor Rhinitis

Mr. J. BERNSTIEN (Liverpool) writes: I was extremely surprised at the reply which was given to the question concerning chronic vasomotor rhinitis (Aug. 12, p. 230). This is an accepted well-known allergic condition, and local treatment is of only palliative effect and should consist of cautery application to any sensitive points found in the nose, which are usually at the anterior or posterior ends of the inferior turbinals and tubercle of the nasal septum, or by nasal ionization with zinc. But these local procedures are of very little value and should only be supplementary to treatment by desensitization and avoidance of the allergen concerned.

Correction

The first line of the fourth paragraph of the annotation headed "Seeing is Believing" (Aug. 26, p. 281) contained a misprint. It should have read "The first interest of a commercial firm is in its commerce."

Disclaimer

Dr. C. O'DONOVAN (Burbage, Hinckley) asks us to state that he had no knowledge that his name would be published (as it was in a provincial evening paper) in connexion with the supply of penicillin to a patient, nor did he give permission for it to be used.